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DESIGN CRITERIA

ENVIRONMENTAL ANALYTICAL ANNEX

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RECORD OF REVISION

PROCEDURE

If there are changes to the procedure, the revision number increases by one. These changes are indicated in the left margin of the body by an arrow (>) at the beginning of the paragraph that contains a change.

Example:

- > The arrow in the margin indicates a change.

Rev. No.	Description of Changes	Revision On Page(s)	Dated
0	Original Issue	All	12/04/92
1	Per ECN #5866	All	1/14/93

RECORD OF REVISION (CONTINUATION SHEET)

Rev. No.	Description of Changes	Revision on Page(s)	Dated
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DESIGN CRITERIA DOCUMENT
REV. 1, WVNS-DC-058
ENVIRONMENTAL ANALYTICAL ANNEX

1.0 INTRODUCTION

The Environmental Analytical Annex (EAA) will be operated by the Analytical and Process Chemistry Department. Its primary function is to provide analyses of nonradioactive samples for organic and inorganic chemicals listed in 40 CFR Part 261 Appendix IX and other target analyses. The majority of samples to be analyzed are in support of ground water monitoring for Federal and State Regulatory Compliance and phase II characterization. In addition, it is anticipated that analyses of miscellaneous samples will be performed.

As shown on Exhibit 1, (Appendix 7.1) the EAA is housed in an existing central laboratory, the Expanded Lab Facility, which contains two independent laboratory units, the Environmental Analytical Annex (EAA) and the Expanded Environmental Laboratory (EEL). Construction of the EEL is complete with all equipment installed. This lab is currently an operating facility.

The construction of the EAA however, is not complete. Installation of the equipment, piping, fume hoods, local exhausters, ducting, and air handling facilities remains to be completed under the EAA program. The following design requirements pertain primarily to the EAA. However, since the EEL and EAA are housed within the same building and are supported by a common central HVAC system, certain design requirements pertain to both labs.

Other EAA program scope of work items such as janitorial service requirements, handicap access, grading, paving, and safety barricades also pertain to both the EEL and EAA labs.

The allowable floor loading for the Expanded Lab Facility Building has been revised due to the limitations of the floor material selected and its method of installation. The uniform loading of 200 psf and the concentrated loading of 50 psi shall be the maximum load values. (Reference: WVNS letter EG:92:0139)

Section 2 of this document specifies the design requirements of the EAA Program engineering.

Section 3 of the document describes the EAA Laboratory areas, processes, and instrumentation.

Section 4 lists all anticipated chemicals to be used in the EAA and their associated Chemical Abstracts Service registry number (CAS #). It also identifies listed carcinogens and highly toxic contaminants. Section 5 provides calculations of potential emission rates and the amount from each process. Section 6 provides summaries for the air potential emissions from: each fume hood, each local exhaust hood, and the combined potential emissions for the Environmental Analytical Annex. Section 7.0, Appendix, is provided to include pertinent drawings on the EAA Lab room and equipment arrangements and associated bills of material.

Reference Standards and Guides of that document, specifically ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers), ACGIH (American Conference of Governmental Industrial Hygienists), CGA (Compressed Gas Association), and the NFPA (National Fire Protection Association) shall be used to establish the design.

2.0 SPECIFIC DESIGN REQUIREMENTS

- 2.1 Install seven (7) laboratory fume hoods in the EAA Laboratory as follows; two (2) 5 foot units in the Wet Lab; two (2) 5 foot units in the Extraction Lab; two (2) 5 foot units in the Metals Lab, and one (1) 4 foot unit in the Sample Receipt Lab.

The American Society of Heating, Refrigerating, and Heating Engineers (ASHRAE) and the American Conference of Governmental Industrial Hygienists (ACGIH) recommend a Class A rating for the handling of materials of high toxicity or which are volatile carcinogens. A significant number of such materials will be handled and are listed in Table 4.2. As such, all EAA lab fume hoods shall be designed for and operated as Class A units. The Class A fume hood design requires an average of 125 to 150 fpm face velocity across the hood opening with corresponding minimums of 100 to 125 fpm at any one point.

The selection of the exhaust system is based upon the most effective combination of risk assessment, ease of engineering and maintenance, and installation cost factors, all relative to the existing building construction and HVAC system design. Each fume hood shall be connected to an individual air exhaust and an exhaust stack. The exhaust and ductwork shall be designed to the Class A rating to provide the required air velocities at the hood.

All fume hoods are to normally operate continuously 24 hours/day. In case of a building fire, all fume hoods are to remain in operation per the requirements of NFPA 45. No local control shall be provided for operator adjustment. Remote controls shall be provided for maintenance purposes.

There shall be no installed standby spare exhaust for any of the seven (7) fume hoods. If any operating exhaust fails, that fume hood shall be shut down and can not be operated until repairs are completed.

All fume hoods shall have dedicated air flow monitoring devices which shall alarm the operator if low flow occurs. Monitors shall provide a visual flow rate for operator verification of normal safe operating range.

Fume hood design shall utilize stainless steel liners to establish a flame spread index of less than 25. Each fume hood shall have a dedicated dry chemical fire suppression system with individual control to extinguish fires within the hood. An alarm shall sound to indicate the specific fume hood fire.

All fume hood exhaust ducts shall have check valves to prevent backflow should that system be down.

- 2.2 Install eight (8) local exhaust hoods in the EAA Laboratory as follows: five (5) units in the Gas Chromatography Lab; one (1) unit in the Wet Lab; one (1) unit in the Extraction Lab; and one (1) unit in the Metals Lab.

All Gas Chromatography Lab local exhaust hoods (5) shall be connected to a central air exhaust system having a single exhaust stack. The exhauster and duct work shall be sized to maintain a minimum of 150 fpm at the entrances to the hoods.

The Gas Chromatography Lab local exhaust system shall have an installed standby spare exhauster to reestablish system capacity should the primary exhauster fail. An air flow monitoring device shall alarm the loss of flow and provide input to the exhauster control. Loss of pre-set exhaust flow shall shut down the primary and start the standby exhauster. The air flow monitoring device shall be similar to those used on the fume hoods.

The local exhaust hoods of the Wet Lab (1), Extraction Lab (1), and the Metals Lab (1) shall have individual exhausters each with a discharge stack. There shall be no installed standby spare exhauster for any of these local exhaust hoods. If any operating exhauster fails, that local exhauster hood shall be shut down until repairs are completed.

All Gas Chromatography Lab local exhaust hoods (5) are to normally operate continuously 24 hours/day. No local control shall be provided for operator adjustment. Remote controls shall be provided for maintenance purposes.

The local exhaust hoods of the Wet (1), Extraction (1), and Metals Labs (1) shall run upon operator demand. Local controls shall be provided for operator selection.

No air flow monitoring devices or alarms are required and shall not be provided for any of the individual local exhaust hoods of the Wet, Extraction, and Metal Labs.

All local exhaust hoods and ductwork shall be constructed of materials with a flame spread index of less than 25. No fire suppression is required and shall not be provided for any of the individual lab room local exhaust hoods.

All local exhaust system ductwork shall have check valves to prevent backflow should the fan for that duct be down.

- 2.3 For manned operation, all EAA lab rooms shall be designed to operate at a lower pressure than the connection hallway. An air balance shall be established to maintain a flow of 400-600 CFM from the hallway into the lab rooms to control cross-room contamination.

To maintain flow from the hall to the lab rooms, only a "first level failure" criteria shall be considered. If the remaining level of lab room exhaust capability should also fail, no provision shall be made to maintain the designed flow from the hall.

To maintain lab room air balance under exhauster failure, the Expanded Lab Building central HVAC system air flow supply for the lab rooms shall be adjusted based on exhauster performance. The discharge ducts of the lab room fume hood exhausters (7) and the Gas Chromatography Lab local exhauster system (1), shall have flow monitors. Sensing of flow loss shall cause the control to reposition the supply damper valve to reestablish the air balance and allow continued lab room operation. The individual discharge ducts of the local exhausters of the Wet (1), Extraction (1), and Metals (1) Labs have flow rates which can be accommodated by the air balance design and as such, will not be monitored or require control of the air supply.

The sample receipt lab has only one (1) fume hood. Upon exhauster failure, adjustment of the HVAC supply cannot restore the lab room to a negative pressure. To maintain lab room pressure lower than the hall causing flow into the room, a backup local room exhauster shall be installed. Control of this local room exhauster shall be interlocked to the fume hood flow monitor. Loss of fume hood flow shall automatically start the local room exhauster. Re-establishment of the fume hood flow shall shut it down.

The electrical recepticals located on the fume hood shall be interlocked to exhauster flow rate. The isolated circuit for the individual fume hood electrical recepticals cannot be manually energized unless the fume hood air flow monitor is at or above the minimum acceptable flow rate. If a flow rate failure occurs, the electrical fixture circuit shall be interrupted and cannot be manually reset until the required flow rate is re-established.

The Expanded Environmental Lab is to operate at a higher pressure than the Environmental Analytical Annex to prevent cross contamination from the EAA to the EEL. The central building HVAC system will be adjusted to maintain the EEL at the higher pressure.

The ventilation exhauster of the Chemical Storage Room shall be replaced with an industrial rated, long life, unit.

- 2.4 On the basis of the established laboratory analytical procedures, the concentrations of the chemicals used are estimated to result in minimum emissions rates. These rates are insignificant and will not require emissions testing or any emissions control such as a scrubber. An air emissions permit is required and shall be applied for. See Section 4 for the list of anticipated chemicals. See Section 5 and 6 for the calculations of potential emissions.

The discharge stacks (7), for the various lab fume hoods, the discharge stack (1) of the central exhaust system for the Gas Chromatography local hoods, and the stacks (3) for the individual Wet, Extraction, and Metals Lab local exhaust hoods, shall not include provisions for emissions monitoring.

- 2.5 The fans, duct work, and discharge stacks of the air handling systems shall be supported on service platforms. One is to be located on the south side of the expanded laboratory facility building (opposite the Gas Chromatography and Wet Labs); the other located on the north side (opposite the Metal and Extraction Labs). These platforms shall be a steel fabrication, supported on concrete foundations and isolated from the main building structure.
- 2.6 Laboratory furniture and equipment shall be installed in the five (5) lab rooms and the Bulk and Chemical Storage Rooms, in accordance with drawing 4788D002, sheet 2, and associated bill of material, DCD-1. See Appendix (7.0), Items 7.2 and 7.3.
- 2.7 All laboratory equipment requiring hot and cold water and drain service shall be piped utilizing the supply and drain lines installed under the previous building construction. Eye wash stations are to be provided within each of the five (5) lab rooms of the EAA. Two (2) combination eye wash/shower stations are located in the hallway area and were installed under the previous Expanded Lab Building construction phase. All eyewash and combination eyewash/shower stations are to be in accordance with ANSI.Z358.1, latest revision. No tempered water shall be required for these stations.
- 2.8 Provide an inert gas supply and distribution center including piping to the Gas Chromatography Extraction and the Metals Labs. Inert gas supply to include argon, nitrogen, and helium. Inert gas cylinders shall be located outside the Expanded Lab Building. Regulators, controls, and manifold piping shall be provided to connect several like cylinders and permit automatic changeover as cylinders are depleted.

The gas distribution center shall be a separate roofed enclosure, four sides with double doors, isolated from, but adjacent to the EAA laboratory facility. The enclosure shall be mounted on a concrete slab, and provide weather protection for the inert gas cylinders. Lighting and power receptacles shall be installed. Truck access shall be provided to permit the delivery and pick up of the required inert gas cylinders.

All inert, nitrous oxide, and acetylene gas supply piping for the lab rooms shall include regulators, filters, and fittings per manufacturer specifications for the equipment to be serviced.

Local tank supply of acetylene and nitrous oxide shall be provided in the Metals Lab for the Atomic Absorption spectrophotometer.

All work shall be completed in accordance with the standards of the Compressed Gas Association.

- 2.9 The southeast room of the EAA lab shall be designed into an office area. A separate HVAC system unit shall be installed for heating and cooling. Humidification control shall maintain 50% relative humidity in the winter and 60% in the summer. The existing building central HVAC system has the reserve capacity to provide the heating and cooling energy requirements for the office unit. Makeup air shall be provided by the existing building central HVAC system which has the reserve fan capacity.

The existing EAA lab telephone and data communication shall be extended into the office area. The existing EAA lab electrical system shall be extended into the office area to provide proper power receptacles and illumination. The existing EAA lab fire protection system shall be extended into the storage room to provide proper fire suppression capability.

- 2.10 Provide an enclosure exterior on the south face of the expanded lab facility building to serve as the EEL and the EAA janitorial service center, the handicap entrance, and the main delivery area. The enclosure shall be architecturally similar to the main building and shall connect directly to the south face entrances for both labs. The enclosure shall contain the materials, equipment and utilities required to provide janitorial services to both labs.

The flooring of the enclosure shall be designed for a maximum of 200 psf and 50 psi for concentrated loads.

The stairs and platform to access the enclosure shall be roofed to minimize the effects of rain, snow, and ice and be designed to concrete and metal construction.

The existing gutters and drain pipes shall be revised to suit the installation of the new enclosure. Gutters and drain pipes shall be installed for the new enclosure to control roof drainage.

The enclosure shall be provided with a hot water (glycol solution) cabinet heater thermostatically controlled and sized to maintain a 60°F temperature during the heating season. Hot water (glycol solution) supply shall be provided by the existing central building heating system which has the reserve capacity. The enclosure shall be ventilated only during the off heating season.

The existing facility electrical system shall be extended into the enclosure to provide proper power receptacles and illumination. The existing EAA lab fire protection system shall be extended into the enclosure to provide proper fire suppression.

- 2.11 Ramp access shall be provided to the entrances of both the EAA and the EEL labs for handicap personnel. The ramp access design shall be incorporated as part of the enclosure under Item 2.10 permitting a single ramp to access both labs.
- 2.12 The existing grade at the east and south ends of the expanded lab facility building shall be revised to meet the requirements of the existing yard electrical equipment, access ramps, stairs, and proper drainage of these areas and the crawl space of the Expanded Lab Building.
- 2.13 The minimum amount of asphalt paving shall be installed to permit wheelchair unloading from transport vehicles and wheel chair access to the ramp base for handicap personnel.

Safety barricades, both new and existing, will be provided or relocated as required to protect personnel, utilities, and equipment.
- 2.14 Analytical and Process Chemistry has established that the analytical instrumentation of the Expanded Laboratory Facility Building requires a humidity control range of 60% maximum and 50% minimum. The additional HVAC equipment needed to supply and install this humidity control is a separate WVNS project being executed by others.
- 2.15 Utility supply mains, 3 inch potable water, 1 1/2 inch natural gas, and 2 inch compressed air, are presently run underground to the area immediately southeast of the Expanded Lab Building. Only the water and compressed air mains shall be extended and connected to the building potable water, and instrument air distribution piping located in the Utility Room of this building. The supply ends of these mains shall be connected to the plant potable water source and the instrument air source, both located within the Plant Process Utility Room, by Plant Engineering Group under a separate WVNS project.

The potable water shall be isolated from the lab supply by backcheck valving.

- 2.16 The compressed air main supply line shall provide instrument quality air of 1 CFM at 54 psig for the EAA Lab operations. The Plant Instrument Air supply shall provide the lab with instrument quality (-40°F dewpoint, oil-free) air. There will be no requirement for further drying for lab operations.
- 2.17 The existing smoke/fire detectors of the Expanded Lab Building alarm the occupants and control the sprinkler system in case of a fire. This system shall also shut down the building's control HVAC system. Only after the fire has been extinguished and the smoke dissipated, can the central HVAC system be manually restarted.

A status light and an audio device shall be installed at each of the EEL and EAA entrance doors to warn approaching personnel of a fire and subsequent shutdown of the central HVAC system.

The proper quantity and location of individual hand-operated fire extinguishers were installed in the EAA Lab under the previous Expanded Lab Building construction phase.

- 2.18 The existing Expanded Lab Facility Building entrances , platform, and stairs, which are constructed of wood, shall be removed and replaced wtih designs of concrete and metal construction. These entrances include those at the north and east sides of the mechanical room, the east and south sides of the storage room, and the west side of the EEL room. All entrance platforms shall be roofed.
- 2.19 Provide adequate accessways to and ventilation for the crawl space beneath the Expanded Lab Building.
- 2.20 All utilities and processes including tools, equipment, materials, and components, shall be labeled per WVNS SOP 00-30.
- 2.21 A satelite accumulation area shall be required prior to the operation of the Expanded Analytical Annex. A pre-engineered hazardous waste storage locker of approximately 500 gal. rated capacity shall be installed adjacent to the Expanded Lab Building. The storage locker shall be designed to meet all WVNS operating and safety requirements. The existing EAA lab electrical system shall be extended to provide the proper heating, ventilating, power receptacles, and illumination. A self contained dry chemical fire suppression system shall be included.

3.0 DESCRIPTION OF ENVIRONMENTAL ANALYTICAL ANNEX (EAA) LABORATORIES

The EAA includes five (5) laboratory areas, each of which is described below in more detail. The EAA contains seven (7) fume hoods for handling chemicals and samples during sample preparation and analysis. Various equipment and instrumentation will be exhausted through eight (8) local exhaust hoods located as described in the following labs.

3.1 Sample Receipt Laboratory

The laboratory will be utilized to perform sample preservation, splitting, and refrigeration of samples. A computer station will be used to track samples and manage the data generated from sample analysis. Sample activities include observation of physical characteristics such as color, turbidity, phase separation, and solids formation. Chemical related properties such as pH will also be performed. Samples will be preserved by adjusting the pH of the sample with acidic or basic solutions depending on the requirements of a particular analysis. The laboratory will contain one (1) fume hood.

Exhaust Units

Fume Hood No. 1; 4'-0" width; 1000 CFM (nominal)

3.2 Wet Laboratory

The laboratory will be utilized for the preparation of chemical standards and quality control samples. Chemicals used will include concentrated mineral acids, oxidizers, and organic/inorganic reagents. Laboratory glassware and equipment will also be cleaned in this area. The laboratory will contain two (2) fume hoods and one (1) local exhaust hood for a glassware drying oven.

Exhaust Units

Fume Hood No. 2; 5"-0" width; 1400 CFM (nominal)

Fume Hood No. 3; 5"-0" width; 1400 CFM (nominal)

Local Exhaust Hood 1 - Oven; 300 CFM (nominal)

3.3 Gas Chromatography Laboratory

The laboratory will be utilized to analyze samples for organic constituents using EPA SW-846 methodologies by Gas Chromatography (GC) and Gas Chromatography Mass Spectroscopy. To analyze for volatile components, a measured volume of aqueous sample is purged with inert gas to drive off the volatiles, which are then collected on a trap. The collected volatiles are then thermally desorbed from the trap and separated on the gas chromatographic column into individual components. The components are then detected using a suitable detector linked with the data system. Analysis for semi-volatile components is accomplished in a similar fashion, except that the samples are extracted in a suitable organic solvent, concentrated, and injected in small amounts directly into the gas chromatographic column. Analysis of pesticides, PCB's, herbicides, and sample screening will also be performed utilizing Gas Chromatographic techniques. The laboratory will contain five (5) local exhaust hoods for the analytical equipment.

Exhaust Units

Local Exhaust Hood 2 - GC; 300 CFM (nominal)
Local Exhaust Hood 3 - GC; 300 CFM (nominal)
Local Exhaust Hood 4 - GC; 300 CFM (nominal)
Local Exhaust Hood 5 - GC; 300 CFM (nominal)
Local Exhaust Hood 6 - GC; 300 CFM (nominal)
1500 CFM Central System (nominal)

3.4 Extraction Laboratory

This laboratory will be utilized to perform sample preparation for organic analysis. Chemicals used shall include organic solvents, acids, and bases. Organic analysis utilizing High Performance Liquid Chromatography (HPLC) will also be performed in this area.

HPLC is similar in principle to the GC, except for the use of a liquid instead of a gas mobile phase. The laboratory will contain two (2) fume hoods and one (1) local exhaust hood for the analytical equipment.

Exhaust Units

Fume Hood No. 4; 5'-0" width; 1400 CFM (nominal)
Fume Hood No. 5; 5'-0" width; 1400 CFM (nominal)
Local Exhaust Hood 7 - HPLC; 300 CFM (nominal)

3.5 Metals Laboratory

This laboratory will be used to perform sample preparation and analysis for metals by Atomic Absorption Spectroscopy (AA) utilizing both flame and graphite furnace techniques. The laboratory will contain two (2) fume hoods and one (1) local exhaust hood for the analytical equipment.

Exhaust Units

Fume Hood No. 6; 5'-0" width; 1400 CFM (nominal)
Fume Hood No. 7; 5'-0" width; 1400 CFM (nominal)
Local Exhaust Hood 8 - AA; 300 CFM (nominal)

4.0 ENVIRONMENTAL ANALYTICAL ANNEX LABORATORY CHEMICALS

Table 4-1 lists the chemicals routinely utilized to support analysis by SW-846 or equivalent methodology. The chemicals are divided into five (5) groups: (1) volatile organic analyses compounds, (2) semi-volatile organic analyses compounds, (3) organic solvent stock, (4) metals analysis, and (5) miscellaneous chemicals. The volatile and semi-volatile organic analysis compounds are further divided into classes based on the determinative methods that are used to identify and quantify them. Some of the chemicals may appear in more than one class, as they may be determined by several different methods. This permit application provides calculations of potential emissions for those compounds listed in Table 4-2.

Table 4-1
Environmental Analytical Annex
SUMMARY OF CHEMICALS

VOLATILE ORGANIC ANALYSIS COMPOUNDS

Halogenated Volatiles

Benzyl Chloride	[100-44-7]
Bromobenzene	[108-86-1]
Bromodichloromethane	[75-27-4]
Bromoform	[75-25-2]
Bromomethane	[74-83-9]
Carbon tetrachloride	[56-23-5]
Chlorobenzene	[108-90-7]
Chloroethane	[75-00-3]
2-Chloroethyl vinyl ether	[110-75-8]
Chloroform	[67-66-3]
Chloromethane	[74-87-3]
Chloromethyl methyl ether	[107-30-2]
Dibromochloromethane	[124-48-1]
Dibromomethane	[74-95-3]
1,2-Dichlorobenzene	[95-50-1]
1,3-Dichlorobenzene	[541-73-1]
1,4-Dichlorobenzene	[106-46-7]
Dichlorodifluoromethane	[75-71-8]
1,1-Dichloroethane	[75-34-3]
1,2-Dichloroethane	[107-06-2]
1,1-Dichloroethene	[75-35-4]
trans-1,2-Dichloroethene	[156-60-5]
Dichloromethane	[75-09-2]
1,2-Dichloropropane	[78-87-5]
cis-1,3-Dichloropropene	[10061-01-5]
trans-1,3-Dichloropropene	[10061-02-6]
1,1,2,2-Tetrachloroethane	[79-34-5]
1,1,1,2-Tetrachloroethane	[630-20-6]
Tetrachloroethene	[127-18-4]
1,1,1-Trichloroethane	[71-55-6]
1,1,2-Trichloroethane	[79-00-5]
Trichloroethene	[79-01-6]
Trichlorofluoromethane	[75-69-4]
1,2,3-Trichloropropane	[96-18-4]
> Vinyl Bromide	[593-60-2]
Vinyl Chloride	[75-01-4]

Halogenated and Aromatic Volatiles

Benzene	[71-43-2]
Bromobenzene	[108-86-1]
Bromoform	[74-97-5]
Bromochloromethane	[75-27-4]
Bromodichloromethane	[75-25-2]
Bromoethane	[74-83-9]
n-Butylbenzene	[104-51-8]
sec-Butylbenzene	[135-98-8]
tert-Butylbenzene	[98-06-6]
Carbon tetrachloride	[56-23-5]
Chlorobenzene	[108-90-7]
Chlorodibromomethane	[124-48-1]
Chloroethane	[75-00-3]
Chloroform	[67-66-3]
Chloromethane	[74-87-3]
2-Chlorotoluene	[95-49-8]
4-Chlorotoluene	[106-43-4]
Dibromomethane	[74-95-3]
1,2-Dibromo-3-chloropropane	[96-12-8]
1,2-Dibromoethane	[106-93-4]
Dibromomethane	[74-95-3]
1,2-Dichlorobenzene	[95-50-1]
1,3-Dichlorobenzene	[541-73-1]
1,4-Dichlorobenzene	[106-46-7]
Dichlorodifluoromethane	[75-71-8]
1,1-Dichloroethane	[75-34-3]
1,2-Dichloroethane	[107-06-2]
1,1-Dichloroethene	[75-35-4]
cis-1,2-Dichloroethene	[156-59-4]
trans-1,2-Dichloroethene	[156-60-5]
1,2-Dichloropropane	[78-87-5]
1,3-Dichloropropane	[142-28-9]
2,2-Dichloropropane	[590-20-7]
1,1-Dichloropropene	[563-58-6]
cis-1,3-Dichloropropene	[10061-01-5]
trans-1,3-Dichloropropene	[10061-02-6]
Ethylbenzene	[100-41-4]
Hexachlorobutadiene	[87-68-3]
Isopropylbenzene	[98-82-8]
p-Isopropyltoluene	[99-87-6]
Methylene chloride	[75-09-2]
Naphthalene	[91-20-3]
n-Propylbenzene	[103-65-1]
Styrene	[100-42-5]
1,1,1,2-Tetrachlorethane	[630-20-6]
1,1,2,2-Tetrachloroethane	[79-34-5]
Tetrachloroethene	[127-18-4]
Toluene	[108-88-3]
1,2,3-Trichlorobenzene	[87-61-6]
1,2,4-Trichlorobenzene	[120-82-1]
1,1,1-Trichloroethane	[71-55-6]

Halogenated and Aromatic Volatile (contin.)

1,1,2-Trichloroethane	[79-00-5]
Trichloroethene	[79-01-6]
Trichlorofluoromethane	[75-69-4]
1,2,3-Trichloropropane	[96-18-4]
1,2,4-Trimethylbenzene	[95-63-6]
1,3,5-Trimethylbenzene	[108-67-8]
Vinyl chloride	[75-01-4]
o-xylene	[95-47-6]
m-xylene	[108-38-3]
p-xylene	[106-42-3]

Nonhalogenated Volatile Organics

Diethyl ether	[60-29-7]
Ethanol	[64-17-5]
Methyl ethyl ketone	[78-93-3]
Methyl isobutyl ketone	[108-10-1]

Acrolein, Acrylonitrile

Acrolein	[107-02-8]
Acrylonitrile	[107-13-1]

Aromatic Volatiles

Benzene	[71-43-2]
1,2-Dichlorobenzene	[95-50-1]
1,3-Dichlorobenzene	[541-73-1]
1,4-Dichlorobenzene	[106-46-7]
Ethylbenzene	[100-41-4]
Toluene	[108-88-3]
o-xylene	[95-47-6]
m-xylene	[108-38-3]
p-xylene	[106-42-3]

Volatile Organic Compounds

Acetone	[67-64-1]
Acetonitrile	[75-05-8]
Acrolein	[107-02-8]
Acrylonitrile	[107-13-1]
Allyl alcohol	[107-18-6]
Allyl chloride	[107-05-1]
Benzene	[71-43-2]
Benzyl chloride	[100-44-7]
Bromobenzene	[108-86-1]
Bromoacetone	[598-31-2]
Bromochloromethane	[74-97-5]

Volatile Organic Compounds (contin.)

Bromodichloromethane	[75-27-4]
4-Bromofluorobenzene	[460-00-4]
Bromoform	[75-25-2]
Bromomethane	[74-83-9]
2-Butanone (Methyl ethyl ketone)	[78-93-3]
n-Butylbenzene	[104-51-8]
sec-Butylbenzene	[135-98-8]
tert-Butylbenzene	[98-06-6]
Carbon disulfide	[75-15-0]
Carbon tetrachloride	[56-23-5]
Chlorobenzene	[108-90-7]
Chlorodibromomethane	[124-48-1]
Chloroethane	[75-00-3]
2-Chloroethanol	[107-07-3]
2-Chloroethyl vinyl ether	[110-75-8]
Chloroform	[67-66-3]
Chloromethane	[74-87-3]
Chloroprene	[126-99-8]
3-Chloropropionitrile	[542-76-7]
2-Chlorotoluene	[95-49-8]
4-Chlorotoluene	[106-43-4]
Dibromochloromethane	[124-48-1]
1,2-Dibromo-3-chloropropane	[96-12-8]
1,2-Dibromoethane	[106-93-4]
Dibromomethane	[74-95-3]
1,2-Dichlorobenzene	[95-50-1]
1,3-Dichlorobenzene	[541-73-1]
1,4-Dichloro-2-butene	[764-41-0]
Dichlorodifluoromethane	[75-71-8]
1,1-Dichloroethane	[75-34-3]
1,2-Dichloroethane	[107-06-2]
1,1-Dichloroethene	[75-35-4]
cis-1,2-Dichloroethene	[156-59-2]
trans-1,2-Dichloroethene	[156-60-5]
1,2-Dichloropropane	[78-87-5]
1,3-Dichloropropane	[142-28-9]
2,2-Dichloropropane	[594-20-7]
1,3-Dichloro-2-propanol	[96-23-1]
1,1-Dichloropropene	[563-58-6]
cis-1,3-Dichloropropene	[10061-01-5]
trans-1,3-Dichloropropene	[10061-02-6]
1,2:3,4-Diepoxybutane	[1464-53-5]
1,4-Difluorobenzene	[540-36-3]
> Dimethylsulfate	[77-78-1]
1,4-Dioxane	[123-91-1]
Epichlorohydrin	[106-89-8]
Ethanol	[64-17-5]
Ethylbenzene	[100-41-4]
Ethylene oxide	[75-21-8]
> Ethylene imine	[151-56-4]
Ethyl methacrylate	[97-63-2]
Hexachlorobutadiene	[87-68-3]
2-Hexanone	[591-78-6]
2-Hydroxypropionitrile	[78-97-7]

Volatile Organic Compounds (contin.)

Isobutyl alcohol	[78-83-1]
Isopropylbenzene	[98-82-8]
p-Isopropyltoluene	[99-87-6]
Malononitrile	[109-77-3]
Methacrylonitrile	[126-98-7]
Methylene chloride	[75-09-2]
> 2-Methyl furan	[534-22-5]
Methyl iodide	[74-88-4]
> Methyl isocyanate	[624-83-9]
Methyl methacrylate	[80-62-6]
4-Methyl-2-pentanone	[108-10-1]
Naphthalene	[91-20-3]
Pentachloroethane	[76-01-7]
2-Picoline	[109-06-8]
Propargyl alcohol	[107-19-7]
b-Propiolactone	[57-57-8]
Propionitrile	[107-12-0]
n-Propylamine	[107-10-8]
n-Propylbenzene	[103-65-1]
Pyridine	[110-86-1]
Styrene	[100-42-5]
1,1,1,2-Tetrachloroethane	[630-20-6]
1,1,2,2-Tetrachlorethane	[79-34-5]
Tetrachloroethene	[127-18-4]
Toluene	[108-88-3]
1,2,3-Trichlorobenzene	[87-61-6]
1,2,4-Trichlorobenzene	[120-82-1]
1,1,1-Trichloroethane	[71-55-6]
1,1,2-Trichloroethane	[79-00-5]
Trichloroethene	[79-01-6]
Trichlorofluoromethane	[75-69-4]
1,2,3-Trichloropropane	[96-18-4]
1,2,4-Trimethylbenzene	[95-63-6]
1,3,5-Trimethylbenzene	[108-67-8]
Vinyl acetate	[108-05-4]
Vinyl chloride	[75-01-4]
o-xylene	[95-47-6]
m-xylene	[108-38-3]
p-xylene	[106-42-3]
Xylene (Total)	[1330-20-7]

SEMI-VOLATILE ORGANIC ANALYSIS COMPOUNDSPhenols

2-sec-Butyl-4,6-dinitrophenol (DNBP)	[88-85-7]
4-Chloro-3-methylphenol	[59-50-7]
2-Chlorophenol	[95-57-8]
Cresols	[93-51-6]
2-Cyclohexyl-4,6-dinitrophenol	[131-89-5]
2,4-Dichlorophenol	[120-83-2]
2,6-Dichlorophenol	[87-65-0]
2,4-Dimethylphenol	[105-67-9]
4,6-Dinitro-o-cresol (2-Methyl-4,6-dinitrophenol)	[534-52-1]
2,4-Dinitrophenol	[51-28-5]
2-Nitrophenol	[88-75-5]
4-Nitrophenol	[100-02-7]
Pentachlorophenol	[87-86-5]
Phenol	[108-95-2]
Tetrachlorophenols	
Trichlorophenols	
2,4,6 Trichlorophenol	[88-06-2]

Phthalate Esters

Benzyl butyl phthalate	[85-68-7]
Bis(2-ethylhexyl)phthalate	[117-81-7]
Diethyl phthalate	[84-66-2]
Di-n-butyl phthalate	[84-74-2]
Dimethyl phthalate	[113-11-3]
Di-n-octyl phthalate	[117-84-0]

Nitrosamines

N-Nitrosodimethylamine	[62-75-9]
N-Nitrosodiphenylamine	[86-30-6]
N-Nitrosodi-n-propylamine	[621-64-7]

Nitroaromatics and Cyclic Ketones

Dinitrobenzene	[99-65-0]
2,4-Dinitrotoluene	[121-14-2]
2,6-Dinitrotoluene	[606-20-2]
Isophorone	[78-59-1]
Naphthoquinone	[130-15-4]
Nitrobenzene	[98-95-3]

Haloethers

Bis(2-chloroethoxy)methane	[111-91-1]
Bis(2-chloroethyl) ether	[111-44-4]
Bis(2-chloroisopropyl) ether	[108-60-1]
4-Bromophenyl phenyl ether	[101-55-3]
4-Chlorophenyl phenyl ether	[7005-72-3]

Organophosphorus Compounds

Azinphos methyl	[86-50-0]
Bolstar (Sulprofos)	[35400-43-2]
Chlorpyrifos	[2921-88-2]
Coumaphos	[56-72-4]
Demeton, O and S	[8065-48-3]
Diazinon	[333-41-5]
Dichlorvos	[62-73-7]
Dimethoate	[60-51-5]
Disulfoton	[298-04-4]
EPN	[2104-64-5]
Ethoprop	[13194-48-4]
Fensulfothion	[115-90-2]
Fenthion	[55-38-9]
Malathion	[121-75-5]
Merphos	[150-50-5]
Mevinphos	[7786-34-7]
Monocrotophos	[6923-22-4]
Naled	[300-76-5]
Parathion ethyl	[56-38-2]
Parathion-methyl	[298-00-0]
Phorate	[298-02-2]
Ronnel	[299-84-3]
Sulfotep	[3689-24-5]
TEPP	[21646-99-1]
Stirophos (Tetrachlorovinphos)	[22248-79-9]
Tokuthion (Protothiofos)	[34643-46-4]
Trichloronate	[327-98-0]

Organochlorine Pesticides and PCB's

Aldrin	[309-00-2]
α -BHC	[319-84-6]
β -BHC	[319-85-7]
δ -BHC	[319-86-8]
Gamma-BHC (Lindane)	[58-89-9]
Chlordane	[57-74-9]
4,4'-DDD	[72-54-8]
4,4'-DDE	[72-55-9]
4,4'-DDT	[50-29-3]
Dieldrin	[60-57-1]
Endosulfan I	[959-98-8]
Endosulfan II	[33212-65-9]

Organochlorine Pesticides and PCB's (contin.)

Endosulfan sulfate	[1031-07-8]
Endrin	[72-20-8]
Endrin aldehyde	[7421-93-4]
Heptachlor	[76-44-8]
Heptachlor epoxide	[1024-57-3]
4,4'-Methoxychlor	[72-43-5]
Toxaphene	[8001-35-2]
PCB-1016 (Aroclor-1016)	[12674-11-2]
PCB-1221 (Aroclor-1221)	[11104-28-2]
PCB-1232 (Aroclor-1232)	[11141-16-5]
PCB-1242 (Aroclor-1242)	[53469-21-9]
PCB-1248 (Aroclor-1248)	[12672-29-6]
PCB-1254 (Aroclor-1254)	[11097-69-1]
PCB-1260 (Aroclor-1260)	[11096-82-5]

Chlorinated Herbicides

2,4-D	[94-75-7]
2,4-DB	[94-82-6]
2,4,5-T	[93-76-5]
2,4,5-TP (Silvex)	[93-72-1]
Dalapon	[75-99-0]
Dicamba	[1918-00-9]
Dichlorprop	[120-36-5]
Dinoseb	[88-85-7]
MCPA	[94-74-6]
MCPP	[93-65-2]

Chlorinated Hydrocarbons

2-Chloronaphthalene	[91-58-7]
1,2-Dichlorobenzene	[95-50-1]
1,3-Dichlorobenzene	[541-73-1]
1,4-Dichlorobenzene	[106-46-7]
Hexachlorobenzene	[118-74-1]
Hexachlorobutadiene	[87-68-3]
Hexachlorocyclohexane	[608-73-1]
Hexachlorocyclopentadiene	[77-47-4]
Hexachloroethane	[67-72-1]
1,2,4,5 Tetrachlorobenzene	[95-94-3]
1,2,4-Trichlorobenzene	[120-82-1]

Polynuclear Aromatic Hydrocarbons

Acenaphthene	[83-32-9]
Acenaphthylene	[208-96-8]
Anthracene	[120-12-7]
Benzo(a)anthracene	[56-55-3]
Benzo(a)pyrene	[50-32-8]

Polynuclear Aromatic Hydrocarbons (contin.)

Benzo(b)fluoranthene	[205-99-2]
Benzo(k)fluoranthene	[207-08-9]
Benzo(g,h,i)perylene	[191-24-2]
Chrysene	[218-01-9]
Dibenz(a,j)acridine	[224-42-0]
Dibenzo(a,h)anthracene	[53-70-3]
Dibenzo(a,e)pyrene	[192-65-4]
Dibenzo(a,i)pyrene	[189-55-9]
Fluoranthene	[206-44-0]
Fluorene	[86-73-7]
Indeno(1,2,3-cd)pyrene	[193-39-5]
3-Methylcholanthrene	[56-49-5]
Naphthalene	[91-20-3]
Phenanthrene	[85-01-8]
Pyrene	[129-00-0]

Semivolatile Organic Compounds

> Acetaldehyde	[75-07-0]
Acenaphthene	[83-32-9]
Acenaphthylene	[208-96-8]
Acetophenone	[98-86-2]
2-Acetylaminofluorene	[53-96-3]
1-Acetyl-2-Thiourea	[591-08-2]
> Acrylamide	[79-06-1]
> Aldicarb	[116-06-3]
Aldrin	[309-00-2]
2-Aminoanthraquinone	[117-79-3]
Aminoazobenzene	[60-09-3]
4-Aminobiphenyl	[92-67-1]
> Amitrole	[61-82-5]
Anilazine	[101-05-3]
Aniline	[62-53-3]
> o-Anisidine	[90-04-0]
Anthracene	[120-12-7]
Aramite	[140-57-8]
Aroclor-1016	[12674-11-2]
Aroclor-1221	[11104-28-2]
Aroclor-1232	[11141-16-5]
Aroclor-1242	[53469-21-9]
Aroclor-1248	[12672-29-6]
Aroclor-1254	[11097-69-1]
Aroclor-1260	[11096-82-5]
Azinphos-methyl	[86-50-0]
Barban	[101-27-9]
Benzidine	[92-87-5]
Benzoic acid	[65-85-0]
p-Benzoquinone	[106-51-4]
Benz(a)anthracene	[56-55-3]
Benzo(b)fluoranthene	[205-99-2]
Benzo(k)fluoranthene	[207-08-9]
Benzo(g,h,i)perylene	[191-24-2]
Benzo(a)pyrene	[50-32-8]
Benzyl alcohol	[100-51-6]
α -BHC	[319-84-6]

<u>Semivolatile Organic Compounds (contin.)</u>	
β-BHC	[319-85-7]
δ-BHC	[319-86-8]
Gamma-BHC (Lindane)	[58-89-9]
Bis(2-chloroethoxy)methane	[111-91-1]
Bis(2-chloroethyl)ether	[111-44-4]
Bis(2-chloroisopropyl)ether	[108-60-1]
Bis(2-ethylhexyl)phthalate	[117-81-7]
> Bromodiolone	[28722-56-7]
4-Bromophenyl phenyl ether	[101-55-3]
Bromoxynil	[1689-84-5]
Butyl benzyl phthalate	[85-68-7]
Captafol	[2425-06-1]
Captan	[133-06-2]
Carbaryl	[63-25-2]
Carbofuran	[1563-66-2]
Carbophenothon	[786-19-6]
Chlordane	[57-74-9]
Chlorfenvinphos	[470-90-6]
4-Chloroaniline	[106-47-8]
Chlorobenzilate	[510-15-6]
1-Chloronaphthalene	[90-13-1]
2-Chloronaphthalene	[91-58-7]
4-Chloro-3-methylphenol	[59-50-7]
3-(Chloromethyl) pyridine hydrochloride	[6959-48-4]
2-Chlorophenol	[95-57-8]
4-Chlorophenyl phenyl ether	[7005-72-3]
Chrysene	[218-01-9]
Coumaphos	[56-72-4]
p-Cresidine	[120-71-8]
> Crotonaldehyde	[4170-30-3]
Crotoxyphos	[7700-17-6]
2-Cyclohexyl-4,6-dinitrophenol	[131-89-5]
4,4'-DDD	[72-54-8]
4,4'-DDE	[72-55-9]
4,4'-DDT	[50-29-3]
Demeton-o	[298-03-3]
Demeton-s	[126-75-0]
Diallate (cis or trans)	[2303-16-4]
2,4-Diaminotoluene	[95-80-7]
Dibenzo(a,e)pyrene	[192-65-4]
Dibenz(a,j)acridine	[224-42-0]
Dibenz(a,h)anthracene	[53-70-3]
Dibenzofuran	[132-64-9]
Di-n-butyl phthalate	[84-74-2]
Dichrone	[117-80-6]
> Dichloroacetylene	[7572-29-4]
1,2-Dichlorobenzene	[95-50-1]
1,3-Dichlorobenzene	[541-73-1]
1,4-Dichlorobenzene	[106-46-7]
> 3,3'-Dichlorobenzidine	[91-94-1]
Dichloropropene	[542-75-6]
2,4-Dichlorophenol	[120-83-2]
2,6-Dichlorophenol	[87-65-0]

Semivolatile Organic Compounds (contin.)

Dichlorovos	[62-73-7]	Dicrotophos	[141-66-2]
Dieldrin	[60-57-1]		
Diethyl phthalate	[84-66-2]		
Diethylstilbestrol	[56-53-1]		
Diethyl sulfate	[64-67-5]		
> Diethylzinc	[557-20-0]		
> Diglycidylether	[2238-07-5]		
Dimethoate	[60-51-5]		
3,3'-Dimethoxybenzidine	[119-90-4]		
Dimethylaminoazobenzene	[60-11-7]		
7,12-Dimethylbenz(a)anthracene	[57-97-6]		
3,3'-Dimethylbenzidine	[119-93-7]		
> Dimethylcarbamoyl chloride	[79-44-7]		
> 1,1-Dimethylhydrazine	[57-14-7]		
α -, α -Dimethylphenethylamine	[122-09-8]		
2,4-Dimethylphenol	[105-67-9]		
Dimethyl phthalate	[131-11-3]		
> Dimethylsulfate	[77-78-1]		
1,2-Dinitrobenzene	[528-29-0]		
1,3-Dinitrobenzene	[99-65-0]		
1,4-Dinitrobenzene	[100-25-4]		
4,6- Dinitro-2-methylphenol	[534-52-1]		
2,4-Dinitrophenol	[51-28-5]		
2,4-Dinitrotoluene	[121-14-2]		
2,6-Dinitrotoluene	[606-20-2]		
Dinocap	[39300-45-3]		
Dinoseb	[88-85-7]		
Diphenylamine	[122-39-4]		
5,5-Diphenylhydantoin	[57-41-0]		
1,2-Diphenylhydrazine	[122-66-7]		
Di-n-octyl phthalate	[117-84-0]		
Disulfoton	[298-04-4]		
> Eldrin	[153-18-4]		
Endosulfan I	[959-98-8]		
Endosulfan II	[33213-65-9]		
Endosulfan sulfate	[1031-07-8]		
Endrin	[72-20-8]		
Endrin aldehyde	[7421-93-4]		
Endrin Ketone	[53494-70-5]		
EPN	[2104-64-5]		
Ethion	[563-12-2]		
> Ethyl acrylate	[140-88-5]		
Ethyl carbamate	[51-79-6]		
Ethyl methanesulfonate	[62-50-0]		
Famphur	[52-85-7]		
Fensulfothion	[115-90-2]		
Fenthion	[55-38-9]		
Fluchloralin	[33245-39-5]		
Fluoranthene	[206-44-0]		
Fluorene	[86-73-7]		
2-Fluorobiphenyl	[321-60-8]		
2-Fluorophenol	[367-12-4]		
Heptachlor	[76-44-8]		
Heptachlor epoxide	[1024-57-3]		

Semivolatile Organic Compounds (contin.)

Hexachlorobenzene	[118-74-1]
Hexachlorbutadiene	[87-68-3]
Hexachlorocyclopentadiene	[77-47-4]
Hexachloroethane	[67-72-1]
Hexachlorophene	[70-30-4]
Hexachloropropene	[1888-71-7]
Hexamethyl phosphoramide	[680-31-9]
Hydroquinone	[123-31-9]
Indenol(1,2,3-cd)pyrene	[193-39-5]
Isodrin	[465-73-6]
Isophorone	[78-59-1]
Isosafrole	[120-58-1]
Kepone	[143-50-0]
Leptophos	[21609-90-5]
Malathion	[121-75-5]
Maleic Anhydride	[108-31-6]
Mestranol	[72-33-3]
Methapyrilene	[91-80-5]
Methoxychlor	[72-43-5]
3-Methylcholanthrene	[56-49-5]
4,4'-Methylenebis(2-chloroaniline)	[101-14-4]
> Methyl Hydrazine	[60-34-4]
Methyl methanesulfonate	[66-27-3]
2-Methylnaphthalene	[91-57-6]
Methyl parathion	[298-00-0]
2-Methylphenol	[95-48-7]
3-Methylphenol	[108-39-4]
4-Methylphenol	[106-44-5]
Mevinphos	[7786-34-7]
Mexacarbate	[315-18-4]
Mirex	[2385-85-5]
Monocrotophos	[6923-22-4]
Naled	[300-76-5]
Naphthalene	[91-20-3]
1,4-Naphthoquinone	[130-15-4]
1-Naphthylamine	[134-32-7]
2-Naphthylamine	[91-59-8]
Nicotine	[54-11-5]
5-Nitroacenaphthene	[602-87-9]
2-Nitroaniline	[88-74-4]
3-Nitroaniline	[99-09-2]
4-Nitroaniline	[100-01-6]
5-Nitroanisidine	[99-59-2]
Nitrobenzene	[98-95-3]
4-Nitrobiphenyl	[92-93-3]
Nitrofen	[1836-75-5]
> 4-Penten-2-ol	[625-31-0]
2-Nitrophenol	[88-75-5]
4-Nitrophenol	[100-02-7]
Nitroquinoline-1-oxide	[56-57-5]
N-Nitrosodibutylamine	[924-16-3]
N-Nitrosodiethylamine	[55-18-5]
N-Nitrosodimethylamine	[62-75-9]
N-Nitrosodiphenylamine	[86-30-6]

<u>Semivolatile Organic Compounds (contin.)</u>	
N-Nitrosodi-n-propylamine	[621-64-7]
N-Nitrosomethyllethylamine	[10595-95-6]
N-Nitrosomorpholine	[59-89-2]
N-Nitrosopiperidine	[100-75-4]
N-Nitrosopyrrolidine	[930-55-2]
> N-phenyl-beta-Naphthylamine	[135-88-6]
5-Nitro-o-toluidine	[99-55-8]
Octamethyl pyrophosphoramide	[152-16-9]
4,4'-Oxydianiline	[101-80-4]
Parathion	[56-38-2]
Pentachlorobenzene	[608-93-5]
Pentachloronitrobenzene	[82-68-8]
Pentachlorophenol	[87-86-5]
Phenacetin	[62-44-2]
Phenanthrene	[85-01-8]
Phenobarbital	[50-06-6]
Phenol	[108-95-2]
> 1,4-Phenylenediamine	[106-50-3]
> Phenylglycidyl ether	[122-60-1]
> Phenylhydrazine	[100-63-0]
Phorate	[298-02-2]
Phosalone	[2310-17-0]
Phosmet	[732-11-6]
Phosphamidon	[13171-21-6]
Phthalic anhydride	[85-44-9]
2-Picoline	[109-06-8]
Piperonyl sulfoxide	[120-62-7]
Pronamide	[23950-58-5]
> Propylene oxide	[75-56-9]
Propylthiouracil	[51-52-5]
Pyrene	[129-00-0]
Pyridine	[110-86-1]
Resorcinol	[108-46-3]
Safrole	[94-59-7]
Strychnine	[60-41-3]
Sulfallate	[95-06-7]
Terbuphos	[13071-79-9]
1,2,4,5-Tetrachlorobenzene	[95-94-3]
2,3,4,6-Tetrachlorophenol	[58-90-2]
Tetrachlorvinphos (Stiropbos)	[961-11-5]
Tetraethyl pyrophosphate	[107-49-3]
Thionazine	[297-97-2]
Thiophenol (Benzenthiol)	[108-98-5]
Toluene diisocyanate	[584-84-9]
o-Toluidine	[95-53-4]
Toxaphene	[8001-35-2]
1,2,4-Trichlorobenzene	[120-82-1]
2,4,5-Trichlorophenol	[95-95-4]
2,4,6-Trichlorophenol	[88-06-2]
Trifuralin	[1582-09-8]
2,4,5-Trimethylaniline	[137-17-7]
Trimethyl phosphate	[512-56-1]
1,3,5-Trinitrobenzene	[99-35-4]
Tris(2,3-dibromopropyl) phosphate	[126-72-7]

Semivolatile Organic Compounds (contin.)

Tri-p-tolyl phosphate	[78-32-0]
O,O,O-Triethyl phosphorothioate	[126-68-1]
> Wood dust	
> Polycyclic organic matter	

ORGANIC SOLVENT STOCK

Acetone	[67-64-1]
Acetonitrile	[75-05-8]
Hexane	[110-54-3]
Isooctane	[540-84-1]
Methanol	[67-56-1]
Methylene chloride	[75-09-2]
2-propanol	[67-63-0]
Toluene	[108-88-3]
Ethyl alcohol	[64-17-5]
Cyclohexane	[110-82-7]
Diethyl ether	[60-29-7]
Pentane	[109-66-0]
Hexadecane	[544-76-3]

METALS ANALYSIS

Aluminium metal	[7429-90-5]
> Arsenic and its salts	[7440-38-2]
Arsenic(III) oxide	[1327-53-3]
Barium chloride dihydrate	[10326-27-9]
Beryllium sulfate tetrahydrate	[7787-56-6]
Boric acid	[10043-35-3]
Cadmium metal	[7440-43-9]
Cadmium oxide	[1306-19-0]
Calcium carbonate	[471-34-1]
> Chromium metal and salts	[7440-47-3]
Chromium(IV) oxide	[1333-82-0]
Potassium dichromate	[7778-50-9]
Cobalt metal	[7440-48-4]
Copper metal	[7440-50-8]
Copper(II) oxide	[1317-38-0]
Iron metal	[7439-89-6]
Iron(III) oxide	[1309-37-1]
> Lead	[7439-92-1]
Lead(II) nitrate	[10099-74-8]
Magnesium metal	[7439-95-4]
Magnesium oxide	[1309-48-4]
Manganese(II) chloride tetrahydrate	[13446-34-9]
> Mercury	[7439-97-6]
Mercury(II) chloride	[7487-94-7]
Tin(II) sulfate	[7488-55-3]
Ammonium molybdate(VI) tetrahydrate	[12054-85-2]
Nickel(II) nitrate hexahydrate	[13478-00-7]
Nickel metal	[7440-02-0]
Potassium chloride	[7447-40-7]
Selenious acid	[7783-00-8]
> Sodium silicate nonahydrate	[13517-24-3]

METALS ANALYSIS (contin.)

Silver nitrate	[7761-88-8]
Sodium chloride	[7647-14-5]
Tin metal	[7440-31-5]
Vanadium(V) oxide	[1314-62-1]
Ammonium metavanadate	[7803-55-6]
Zinc metal	[7440-66-6]
Zinc oxide	[1314-13-2]
> Arsenic & soluble compounds	[7440-38-2]
> Arsenic pentoxide	[1303-28-2]
> Arsenic Trioxide	[1327-53-3]
> Arsine	[7784-42-1]
> Barium chloride	[10361-37-2]
> Barium and its salts	[7440-39-3]
> Beryllium and compounds	[7440-41-7]
> Beryllium oxide	[1304-56-9]
> Beryllium sulfate	[13510-49-1]
> Cadmium mercury sulfide	[1365-09-1]
> Cadmium oxide	[1306-19-0]
> Cadmium sulfate	[10124-36-4]
> Chromium VI	[7440-47-3]
> Chromyl chloride	[14977-61-8]
> Iron dextran complex	[9004-66-4]
> Lead inorg. dusts and fumes	[7439-92-1]
> Lead arsenate	[7784-40-9]
> Lead chromate	[18454-12-1]
> Nickel carbonyl	[13463-39-3]
> Nickel monoxide	[1313-99-1]
> Nickel sulfide	[12035-72-2]
> Selenium metal and its salts	[7782-49-2]
> Silica-crystalline	[14464-46-1]
> Silver metal and its salts	[7440-22-4]
> Vanadium	[7440-62-2]
> Zinc chromates	[13530-65-9]
> Zinc phosphide	[1314-84-7]

MISCELLANEOUS CHEMICALS

Sulfuric acid	[7664-93-9]
Sulfuric acid, fuming	[8014-95-7]
Sodium hydroxide	[1310-73-2]
Ascorbic acid	[50-81-7]
> Hydrazine and its salts	[302-01-2]
Hydrochloric acid	[7647-01-0]
Hydrogen peroxide, 30 wt%	[7722-84-1]
Nitric acid	[7697-37-2]
Nitric acid,fuming	[52583-42-3]
Zinc acetate dihydrate	[5970-45-6]
Potassium chloride	[7447-40-7]
Potassium iodide	[7681-11-0]
Tin(II) chloride	[7772-99-8]
Ammonium phosphate, dibasic	[7783-28-0]
Lanthanum oxide	[1312-81-8]
Calcium nitrate tetrahydrate	[13477-34-4]
Lead(II) nitrate	[100099-74-8]

MISCELLANEOUS CHEMICALS (contin.)

Ammonium sulfate	[7783-20-2]
Acetic acid, glacial	[64-19-7]
Ammonium hydroxide	[1336-21-6]
Potassium dichromate	[7778-50-9]
1,5-Diphenylcarbazide	[140-22-7]
Acetone	[67-64-1]
Bromophenol Blue	[115-39-9]
Ammonium pyrrolidinedithiocarbamate	[5108-96-3]
4-Methyl-2-pentanone	[108-10-1]
Sodium chloride	[7647-14-5]
Potassium Permanganate	[7722-64-7]
Potassium persulfate	[7727-21-1]
Mercuric chloride	[7487-94-7]
Aluminium nitrate nonahydrate	[7784-27-2]
Hydroxylamine hydrochloride	[5470-11-1]
Nickel(II) nitrate hexahydrate	[13478-00-7]
Iodine	[7553-56-2]
Potassium cyanide	[151-50-8]
Palladium(II) chloride	[7647-10-1]
Bismuth(III) nitrate pentahydrate	[10035-06-0]
Magnesium chloride hexahydrate	[7791-18-6]
Sulfamic acid	[5329-14-6]
Calcium hypochlorite	[7778-54-3]
Barbituric acid	[67-52-7]
Pyridine	[110-86-1]
Chloramine-T hydrate	[127-65-1]
Potassium phosphate, monobasic	[7778-77-0]
Sodium sulfite	[7757-83-7]
Potassium nitrate	[7757-79-1]
Amylose	[9005-82-7]
Sodium thiosulfate	[7772-98-7]
Sodium sulfate	[7757-82-6]
Methylthymol Blue	[1945-77-3]
Ammonium chloride	[12125-02-9]
Sodium carbonate	[497-19-8]
Sodium bicarbonate	[144-55-8]
4-Aminoantipyrine	[83-07-8]
Potassium ferricyanide	[13746-66-2]
Ammonium iron(II) sulfate hexahydrate	[7783-85-9]
Ammonium cerium(IV) sulfate	[13840-04-5]
Bromodiolone	[28772-56-7]
Magnesium sulfate	[7487-88-9]
Potassium nitrate	[7757-79-1]
Brucine sulfate hydrate	[5787-00-8]
Sulfanilic acid	[121-57-3]
Mercury(II) thiocyanate	[592-85-8]
Iron(III) nitrate nonahydrate	[7782-61-8]
Hydroquinone	[123-31-9]
Mercury(II) nitrate monohydrate	[7783-34-8]
Carbon black	[1333-86-4]
Calcium chloride	[10043-52-4]
Ammonium acetate	[631-61-8]
Ammonium chloride	[12125-02-9]

Miscellaneous Chemicals (contin.)

Ammonium oxalate monohydrate	[6009-70-7]
Boric acid	[10043-35-3]
Sodium acetate	[127-09-3]
Silver nitrate	[7761-88-8]
Florisil	[1343-88-0]
Petroleum ether	[8032-32-4]
Silica gel	[7631-86-9]
Alumina	[1344-28-1]
Copper powder	[7440-50-8]
Mercury	[7439-97-6]
Tetrabutylammonium hydrogen sulfate	[32503-27-8]
Pentafluorobenzyl bromide	[1765-40-8]
18-crown-6-ether	[17455-13-9]
Potassium carbonate	[584-08-7]
Silicic acid	[7699-41-4]
Diethylene glycol monoethyl ether	[111-90-0]
Diazald	[80-11-5]

TABLE 4-2

Environmental Analytical Annex

SUMMARY OF LISTED CARCINOGENS AND HIGHLY TOXIC CONTAMINANTS

Volatile Organic Compounds

<u>Name</u>	<u>[CAS #] (# of Determinative Methods)</u>
Acrolein	[107-02-8] (2)
Acrylonitrile	[107-13-1] (2)
Allyl chloride	[107-05-1] (1)
Benzene	[71-43-2] (3)
Benzyl chloride	[100-44-7] (2)
Bromodichloromethane	[75-27-4] (3)
Bromomethane	[74-83-9] (3)
Carbon tetrachloride	[56-23-5] (3)
Chloroform	[67-66-3] (3)
Chloromethane	[74-87-3] (3)
Chloro methyl ether	[107-30-2] (1)
Chloroprene	[126-99-8] (1)
1,2-Dibromoethane	[106-93-4] (2)
1,2-Dichloroethane	[107-06-2] (3)
1,1-Dichloroethene	[75-35-4] (3)
> Dimethyl sulfate	[77-78-1] (1)
1,4- Dioxane	[123-91-1] (1)
Epichlorohydrin	[106-89-8] (1)
Ethylene oxide	[75-21-8] (1)
> Ethyleneimine	[151-56-4]
Hexachlorobutadiene	[87-68-3] (2)
Methylene chloride	[75-09-2] (3)
> 2-Methyl furan	[534-22-5] (1)
Methyl iodide	[74-88-4] (1)
> Methyl Isocyanate	[624-83-9] (1)
b-Propiolactone	[57-57-8] (1)
Styrene	[100-42-5] (2)
1,1,2,2-Tetrachloroethane	[79-34-5] (3)
Tetrachloroethene	[127-18-4] (3)
1,1,2-Trichloroethane	[79-00-5] (3)
Trichloroethene	[79-01-6] (3)
> Vinyl bromide	[593-60-2]
Vinyl chloride	[75-01-4] (3)

Semi-volatile Organic Compounds

<u>Name</u>	<u>[CAS #] (# of Determinative Methods)</u>
> Acrylamide	[79-06-1]
> Aldicarb	[116-06-3]
Aldrin	[309-00-2] (2)
4-Aminobiphenyl	[92-67-1] (1)
Aniline	[62-53-3] (1)
PCB-1016	[12674-11-2] (2)
PCB-1221	[11104-28-2] (2)
PCB-1232	[11141-16-5] (2)
PCB-1242	[53469-21-9] (2)
PCB-1248	[12672-29-6] (2)
PCB-1254	[11097-69-1] (2)
PCB-1260	[11096-82-5] (2)
Benzidine	[92-87-5] (1)
Benzo(a)pyrene	[50-32-8] (2)
Gamma-BHC (Lindane)	[58-89-9] (2)
Bis(2-ethylhexyl)phthalate	[117-81-7] (2)
Chlordane	[57-74-9] (2)
Chrysene	[218-01-9] (2)
4,4'-DDT	[50-29-3] (2)
3,3'-Dichlorobenzidine	[91-94-1] (1)
Dieldrin	[60-57-1] (2)
3,3'-Dimethylbenzidine	[119-93-7] (1)
1,2-Dinitrobenzene	[528-29-0] (1)
Heptachlor	[76-44-8] (2)
Hexachlorobutadiene	[87-68-3] (2)
Hexamethyl phosphoramide	[680-31-9] (1)
Kepone	[143-50-0] (1)
> Mirex	[2385-85-5]
4,4'-Methylenebis(2-chloroaniline)	[101-14-4] (1)
2-Naphthylamine	[91-59-8] (1)
4-Nitrobiphenyl	[92-93-3] (1)
N-Nitrosodimethylamine	[62-75-9] (2)
Parathion ethyl	[56-38-2] (2)
> 4-Penten-2-ol	[625-31-0]
Phenacetin	[62-44-2] (1)
Toluene diisocyanate	[584-84-9] (1)
o-Toluidine	[95-53-4] (1)
Toxaphene	[8001-35-2] (2)

Organic Solvent Stock

Methylene chloride [75-09-2]

Metals Analysis

>	Antimony trioxide	[1309-64-4]
	Arsenic(III) oxide	[7429-90-5]
	Beryllium sulfate tetrahydrate	[7787-56-6]
>	Cadmium metal, dust sand salts	[7440-43-9]
	Chromium(IV) oxide	[1333-82-0]
	Potassium dichromate	[7778-50-9]
>	Cobalt metal dust and fume	[7440-48-4]
	Lead(II) nitrate	[10099-74-8]
	Nickel(II) nitrate hexahydrate	[13478-00-7]
>	Nickel metal and insoluble compds.	[7440-02-0]
	Mercury(II) chloride	[7487-94-7]
	Vanadium(V) oxide	[1314-62-1]
	Ammonium metavanadate	[7803-55-6]

Miscellaneous Chemicals

>	Lead(II) nitrate	[10099-74-8]
	Potassium dichromate	[7778-50-9]
	Mercuric chloride	[7487-94-7]
	Nickel(II) nitrate hexahydrate	[13478-00-7]
	Mercury(II) thiocyanate	[592-85-8]
	Mercury(II) nitrate monohydrate	[7783-34-8]
	Mercury	[7439-97-6]
>	Arsenic Pentoxide	[1303-28-2]
>	Arsenic Trioxide	[1327-53-3]
>	Arsine	[7784-42-1]
>	Beryllium oxide	[1304-56-9]
>	Beryllium sulfate	[13510-49-1]
>	Cadmium Mercury Sulfide	[1345-09-1]
>	Cadmium oxide	[1306-19-0]
>	Cadmium sulfate	[10124-36-4]
>	Lead arsenate	[7784-40-9]
>	Lead chromate	[18454-12-1]
>	Nickel carbonyl	[13463-39-3]
>	Nickel monoxide	[1313-99-1]
>	Nickel sulfide	[12035-72-2]

5.0 EMISSION CALCULATIONS

5.1 Introduction

All handling and processing of potentially toxic materials in the EAA will be performed in fume hoods. These hoods are designed to capture vapors and particulate matter released during handling and processing of samples. Emissions from instruments and equipment used to perform sample analyses are captured through the use of local exhaust hoods. Each fume hood and local exhaust hood of the Wet, Extraction, and Metals Labs are exhausted through an independent exhaust system which includes the exhaust blower, duct work, and stack. The five (5) local exhaust hoods of the Gas Chromatography Lab are combined and exhausted through an independent exhaust system which includes the exhaust blower, the standby spare exhaust blower, ductwork, check valves, and a single stack. For the purpose of this application each hood or local exhaust hood is considered a single unit to be permitted.

5.2 Fume Hoods

The seven fume hoods located throughout the EAA will be utilized to perform the following applications:

Preparation of organic standards for volatile and semi-volatile analysis by GC, GC-MS and HPLC

Preparation of samples for organic analysis

Preparation of inorganic standards and samples for metals analysis

Wet chemical analysis

Glassware cleaning

5.2.1 Preparation of Organic Standards

A primary source of emissions of organic compounds from the EAA is through the preparation of standards used for calibration of the instrumentation and quality control testing. Standards are prepacked and premeasured quantities of a chemical obtained from reputable vendors. Calibration is accomplished by preparing from the standards a primary dilution. The primary dilution is used to prepare five daily standard samples of various known concentrations which are analyzed and used to generate a five point calibration curve and standard spectrum. These are used to determine the presence and quantity of the standard material in the sample material.

Organic chemical standards are purchased predissolved in methanol, methylene chloride, or 1:1 Hexane/Toluene. Volatile and semi-volatile standards are shipped in gas-tight vials or ampules. Loss of standard material occurs during

the preparation and handling of the calibration and quality control standards. To provide conservative calculations the following assumptions are made: (1) a 10 percent loss of volatile analyte and 1 percent of the semi-volatile analyte occurs during the preparation and handling of the standards (2) Two independent standards must be prepared monthly for all determinative methods. (3) the mass of any particular organic component is 200 ug. A summary of the calculations for volatile and semi-volatile organic compounds appears in Tables 5-1 and 5-2.

5.2.2 Preparation of Organic Samples for Analysis

The most significant source of emissions occurs during the preparation of samples for semi-volatile analysis. Samples are typically extracted in 500 mL methylene chloride. The methylene chloride extract is then evaporated down or concentrated to a final volume of 1 mL. To provide conservative calculations the following assumptions will be made: (1) 500 mL or 660 grams of methylene chloride is volatilized during sample preparation (2) 40 extractions will be performed monthly. A summary of the calculations for methylene chloride emissions appears in Table 5-1.

5.2.3 Preparation of Inorganic Standards and Samples for Metals Analysis.

Stock solutions for metals analysis will be procured from a reputable vendor. Stock solutions containing 1,000 ug/mL (1,000 ppm) of the standard chemical are diluted to generate a set of five standard samples that are then analyzed to generate the standard curve. Unlike organic compounds, metals in aqueous solution under ambient conditions are not volatile and therefore should not be part of the emission calculations. However, it will be assumed that the stock solutions will not be purchased from a vendor, but prepared in the laboratory from powdered reagents.

>

Samples for metals analysis are prepared or digested, by heating and dissolving in an acidic media. The digestion process is designed to quantitatively retain the metals in solution. In order to provide conservative calculations on metals emission during both sample preparation and stock solution preparation the following assumptions will be made: (1) 1800 preparations a month will be performed (2) loss of metals due to volatilization of 0.01 percent will occur (3) each preparation will have a specific metal mass of 100 ug. A summary of the calculations for metals emission due to preparation appears in Table 5-3.

Acid digestion of samples for metal analysis is the primary contributor of potential acid emissions with Nitric and Hydrochloric Acids being the major acid contributors. In order to provide conservative calculations for acid emissions during the acid digestion preparation of samples for metals

analysis, the following assumptions will be made; 1) 1800 digestions per month; 2) 10mL of 70% Nitric Acid used in preparation; 3) density of Nitric Acid is 1.41 g/mL; 4) 10mL of 19% Hydrochloric Acid; 5) density of Hydrochloric Acid is 1.09 g/mL; 6) assume 100% volatilization of acids. The summary of the calculations for acid emissions due to sample digestion is in Table 5-4.

5.2.4 Wet Chemical Analysis

No significant emissions are expected to occur as the result of wet chemical analysis. Wet chemical analysis includes such testing as cyanide analysis, BODs, density, pH and selective electrode probe.

5.2.5 Glassware Cleaning

Glassware will be cleaned by one of two methods, depending upon whether organic or metals analysis is to be performed. Neither method of glassware cleaning is expected to result in significant emissions.

5.3 Local Exhaust Provisions

There will be eight local exhaust hoods provided throughout the EAA facility. For certain equipment such as the atomic absorption spectrophotometer, local exhaust is required to prevent the contamination of personnel and laboratory with potentially hazardous materials that may be evolved during the analysis of samples. A secondary purpose is to remove heat generated from the operation of various analysis support equipment. Local exhaust will be provided for the following equipment:

- (1) one atomic absorption
- (2) five Gas Chromatography
- (3) one HPLC
- (4) one drying oven.

5.3.1 Atomic Absorption Spectrophotometer (AA)

This instrument is utilized in the determination of metals. A sample is aspirated into a flame and the inorganic compounds dissociate into elements in the gaseous form. These atoms become excited by absorbing radiant or thermal energy and emitting this energy as a radiation of characteristic energy. This analytical technique utilizes the emission or absorption of energy to determine which inorganic compounds are present and in what quantities. In order to provide conservative calculations the following conditions are assumed: (1) each sample contains a mass of 100 ug of each metal (2) 95% of the sample is returned as

waste (3) 30 samples analyzed per day (4) each sample is analyzed for all 11 metals (5) 100% emission of all dissociated elements. A summary of the calculations appears in Table 5-5.

5.3.2 Gas Chromatography (GC)

This instrument is utilized for qualitative and quantitative analysis of organics. The sample is introduced into the GC column where the various components are separated from each other and introduced into the detector for quantification and identification.

The instrument typically utilizes a minute sample size for introducing the sample into the column by either purge and trap or direct injection. The organic components are destroyed by the detectors during quantification and identification. In order to provide conservative calculations the following assumptions will be made:

- (1) 240 samples per month
- (2) Samples analyzed for volatiles and semi-volatiles
- (3) Each organic constituent in sample at 1 ug/mL
- (4) Sample size of 0.005 mL
- (5) Detector destruction of 99 %, which equates to a percent emission of 1%.

A summary of the calculations for volatile and semi-volatile organic compounds appears in Tables 5-6 and 5-7.

5.3.3 High Performance Liquid Chromatography (HPLC)

The HPLC is used to analyze semi-volatile organic compounds only.

This instrument is similar in principal to gas chromatography but utilizes liquid instead of a gas mobile phase. The organic constituents are not vaporized as in the GC. Acetonitrile and methanol are the organic solvents that will be used for the liquid mobile phase. Neither solvent is carcinogenic. HPLC is typically equipped with ultraviolet or fluorescence detectors. In order to provide estimates for possible emissions it will be assumed that HPLC emissions are similar to GC emissions calculated in Table 5-7.

5.3.4 Drying Oven

The oven will be used to dry glassware after it has been properly washed. No significant emissions are anticipated.

6.0 Summary of Potential Emissions from the Environmental Analytical Annex

- > To provide the laboratory with the greatest amount of flexibility, the approach in permitting the seven fume hoods and eight local exhaust hoods is the following: (1) all seven fume hoods should be assumed to have emissions of organics, and metals, per the calculations in Tables 5-1, 5-2, 5-3, and 5-4. (2) all eight local exhaust hoods should be assumed to have emissions of metals and organics per the calculations in Tables 5-5, 5-6, and 5-7. This approach will provide the laboratory with the ability to operate in the safest practical manner. In addition, it provides the worst case emissions scenario. Table 6-1 provides the potential emissions for each fume hood. Table 6-2 provides the potential emissions for each local exhaust hood. Table 6-3 provides the potential emissions for the Environmental Analytical Annex by combining the total potential emissions from all seven fume hoods with the total potential emissions from all eight local exhaust hoods.

Calculations for Emissions of Volatiles during Preparation

The volatile organic compound used in the example calculation is bromodichloromethane. Calculations are provided for emissions during standard preparations. See Table 5-1.

Basis of Calculations

Bromodichloromethane can be analyzed by 3 determinative methods. The mass of the standard is 200 ug. Each determinative method will require two standards, one for calibration and one for quality control. The two standards will have a useful life of one month. Emissions are based on 10 percent of the mass being released to the hood ventilation system.

Annual Emissions (ug/yr)

$$(3 \text{ mthds})(200 \text{ ug})(2 \text{ std per month})(12 \text{ month per yr})(0.10) = 1.44E+03 \text{ ug/yr}$$

Hourly Emissions (ug/hr)

$$\frac{(1.44E+03 \text{ ug/yr})}{(24 \text{ hrs/day})(365 \text{ days/yr})} = 1.64E-01 \text{ ug/hr}$$

Shown below is the conversion from ug/yr to lbs/yr. The same type of conversion is used to convert ug/hr to lbs/hr.

$$(1.44E+03 \text{ ug/yr}) \frac{(1g)}{(1E+06 \text{ ug})} \frac{(1lb)}{(454g)} = 3.17E-06 \text{ lbs/yr}$$

Calculations for Emissions of Semi-volatiles during Preparation

The semi-volatile organic compound used in the example calculation is Chlordane. Calculations are provided for emissions during standard preparations. See Table 5-2.

Basis of Calculations

Chlordane can be analyzed by 2 determinative methods. The mass of the standard is 100 ug. Each determinative method will require two standards, one for calibration and one for quality control. The two standards will have a useful life of one month. Emissions are based on 1 percent of the mass being released to the hood ventilation system.

Annual Emissions (ug/yr)

$$(2 \text{ mthds})(100 \text{ ug})(2 \text{ std per month})(12 \text{ month per yr})(0.010) = 4.80E+01 \text{ ug/yr}$$

Hourly Emissions (ug/hr)

$$\frac{(4.80E+01 \text{ ug/yr})}{(24 \text{ hrs/day})(365 \text{ days/yr})} = 5.48E-03 \text{ ug/hr}$$

Shown below is the conversion from ug/yr to lbs/yr. The same type of conversion is used to convert ug/hr to lbs/hr.

$$(4.8E+01 \text{ ug/yr}) \frac{(1g)}{(1E+06 \text{ ug})} \frac{(1lb)}{(454g)} = 1.06E-07 \text{ lbs/yr}$$

Calculations for Emissions of Metals during Preparation

The metal used in the example calculation is Antimony. Calculations are provided for emissions during standard preparations. See Table 5-3.

Basis of Calculations

The mass of the standard is 1000 ug. 1800 preparations will be performed a month. Emissions are based on 0.01 percent of the mass being released to the hood ventilation system.

Annual Emissions (ug/yr)

$$(1000 \text{ ug})(1800 \text{ preps. per month})(12 \text{ month per yr})(0.00010) = 2.16 \text{ E+03 ug/yr}$$

Hourly Emissions (ug/hr)

$$\frac{(2.16E+03 \text{ ug/yr})}{(24 \text{ hrs/day})(365 \text{ days/yr})} = 2.47E-01 \text{ ug/hr}$$

Shown below is the conversion from ug/yr to lbs/yr. The same type of conversion is used to convert ug/hr to lbs/hr.

$$(2.16E+03 \text{ ug/yr}) \frac{(1g)}{(1E+06 \text{ ug})} \frac{(1lb)}{(454g)} = 4.75E-06 \text{ lbs/yr}$$

Calculations for Emission of Acids

The acid used in this example calculation is HNO₃. Calculations are provided for emissions during acid digestion of samples. See Table 5-4.

Basis of Calculations

1800 preparations a month. 10mL of 70% nitric acid used in preparation. Density of Nitric Acid is 1.41 g/mL. 100% volatilization of acid.

Annual Emissions (g/yr)

$$(1800 \text{ samples/month})(10\text{mL acid})(.70 \text{ HNO}_3)(1.41 \text{ g/mL})(12 \text{ mth/yr}) = 2.13 \text{ E+5 g/yr}$$

Hourly Emission (g/hr)

$$\frac{2.13 \text{ E+5 g/yr}}{(24 \text{ hrs/day})(365 \text{ days/yr})} = 2.43 \text{ E+1 g/hr}$$

Shown below is the conversion from g/yr to lbs/yr. The same type of conversion is used to convert ug/hr. to lbs/hr.

$$(2.13 \text{ E+5 g/yr}) \frac{(1 \text{ lb})}{(454 \text{ g})} = 469 \text{ lbs./yr.}$$

Calculations for Emissions of Volatiles and Semivolatiles during Analysis

The volatile organic compound used in the example calculation is benzene. Calculations are provided for emissions during GC analysis. See Tables 5-6 and 5-7.

Basis of Calculations

Concentration of benzene in sample is 1 ug/mL. Two hundred forty samples a month will be analyzed. A typical sample size of .005 mL. Detector destruction efficiency of 99%.

Annual Emissions (ug/yr)

$$(1 \text{ ug/mL})(240 \text{ samples/mth})(.005 \text{ mL})(.99)(12 \text{ mth/yr}) = 1.43E+01 \text{ ug/yr}$$

Hourly Emissions (ug/hr)

$$\frac{(1.43E+01 \text{ ug/yr})}{(24 \text{ hrs/day})(365 \text{ days/yr})} = 1.63E-03 \text{ ug/hr}$$

Shown below is the conversion from ug/yr to lbs/yr. The same type of conversion is used to convert ug/hr to lbs/hr.

$$(1.43E+01 \text{ ug/yr}) \frac{(1g)}{(1E+06 \text{ ug})} \frac{(1lb)}{(454g)} = 3.17E-08 \text{ lbs/yr}$$

Table 5-1 Emissions of Volatile Organic Compounds during Standards Preparation

CHEMICAL NAME	NUMBER OF DETERM. METHODS	NUMBER OF STD. STDS.	MASS OF STD. (ug)	PERCENT EMISSION (%)	UNITS PER YEAR	ANNUAL EMISSIONS (ug)	HOURLY EMISSIONS (ug)	ANNUAL EMISSIONS (lbs.)	HOURLY EMISSIONS (lbs.)
Acrolein	2	2	200	10	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Acrylonitrile	2	2	200	10	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Allyl chloride	1	2	200	10	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Benzene	3	2	200	10	12	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Benzyl chloride	2	2	200	10	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Bromodichloromethane	3	2	200	10	12	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Bromomethane	3	2	200	10	12	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Carbon tetrachloride	3	2	200	10	12	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Chloroform	3	2	200	10	12	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Chloromethane	3	2	200	10	12	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Chloromethyl methyl ether	1	2	200	10	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Chloroprene	1	2	200	10	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
1,2-Dibromoethane	2	2	200	10	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
1,2-Dichloroethane	3	2	200	10	12	1.44E+03	1.64E-01	3.17E-06	3.62E-10
1,1-Dichloroethene	3	2	200	10	12	1.44E+03	1.64E-01	3.17E-06	3.62E-10
>Dimethylsulfate	1	2	200	10	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
1,4-Dioxane	1	2	200	10	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Epichlorohydrin	1	2	200	10	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
>Ethylene imine	1	2	200	10	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Ethylene oxide	1	2	200	10	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Hexachlorobutadiene	2	2	200	10	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Methylene chloride ¹	1	40	6.60E+08	100	12	3.17E+11	3.62E+07	6.97E+02	7.96E-02
>2-Methyl Furan	1	2	200	10	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Methyl iodide	1	2	200	10	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
>Methyl Isocyanate	1	2	200	10	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
b-Propiolactone	1	2	200	10	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Styrene	2	2	200	10	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
1,1,2,2-Tetrachloroethane	3	2	200	10	12	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Tetrachloroethene	3	2	200	10	12	1.44E+03	1.64E-01	3.17E-06	3.62E-10
1,1,2-Trichloroethane	3	2	200	10	12	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Trichloroethene	3	2	200	10	12	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Vinyl chloride	3	2	200	10	12	1.44E+03	1.64E-01	3.17E-06	3.62E-10
>Vinyl bromide	1	2	200	10	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10

¹ Methylene chloride emissions are based upon use during sample preparation/extraction for semi-volatile analysis.

Table 5-2 Emissions of Semi-Volatile Organic Compounds during Standards Preparation

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CHEMICAL NAME	NUMBER OF DETERM. METHODS	NUMBER OF MONTHLY STD. STDS.	MASS OF STD. (ug)	PERCENT EMISSION (%)	UNITS PER YEAR	ANNUAL EMISSIONS (ug)	HOURLY EMISSIONS (ug)	ANNUAL EMISSIONS (lbs.)	HOURLY EMISSIONS (lbs.)
>Acrylamide	1	2	2000	1	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
>Aldicarb	1	2	2000	1	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Aldrin	2	2	2000	1	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
4-Aminobiphenyl	1	2	2000	1	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Aniline	1	2	2000	1	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
PCB-1016	2	2	100	1	12	4.80E+01	5.48E-03	1.06E-07	1.21E-11
PCB-1221	2	2	100	1	12	4.80E+01	5.48E-03	1.06E-07	1.21E-11
PCB-1232	2	2	100	1	12	4.80E+01	5.48E-03	1.06E-07	1.21E-11
PCB-1242	2	2	100	1	12	4.80E+01	5.48E-03	1.06E-07	1.21E-11
PCB-1248	2	2	100	1	12	4.80E+01	5.48E-03	1.06E-07	1.21E-11
PCB-1254	2	2	100	1	12	4.80E+01	5.48E-03	1.06E-07	1.21E-11
PCB-1260	2	2	100	1	12	4.80E+01	5.48E-03	1.06E-07	1.21E-11
Benzidine	2	2	2000	1	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Benzo(a)pyrene	2	2	2000	1	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Gamma-BHC (lindane)	2	2	2000	1	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Bis(2-ethylhexyl)phthalate	2	2	2000	1	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
>Bromodiolene	1	2	200	10	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Chlordane	2	2	100	1	12	4.80E+01	5.48E-03	1.06E-07	1.21E-11
Chrysene	2	2	2000	1	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
4,4'-DDT	2	2	2000	1	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
3,3'-Dichlorobenzidine	1	2	2000	1	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Dieldrin	2	2	2000	1	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
3,3'-Dimethylbenzidine	1	2	2000	1	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
1,2-Dinitrobenzene	1	2	2000	1	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Heptachlor	2	2	2000	1	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Hexachlorobutadiene	2	2	2000	1	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Hexamethyl phosphoramide	1	2	2000	1	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Kepone	1	2	2000	1	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
>Mirex	1	2	2000	1	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
4,4'-Methylenebis-(2-chloroaniline)	1	2	2000	1	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
2-Naphthylamine	1	2	2000	1	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
4-Nitrobiphenyl	1	2	2000	1	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
N-Nitrosodimethylamine	2	2	2000	1	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Parathion ethyl	2	2	2000	1	12	9.60E+02	1.10E-01	2.11E-06	2.41E-10
>4-Penten-2-ol	1	2	2000	1	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Phenacetin	1	2	2000	1	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Toluene diisocyanate	1	2	2000	1	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
o-Toliduidine	1	2	2000	1	12	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Toxaphene	2	2	100	1	12	4.80E+01	5.48E-03	1.06E-07	1.21E-11

Table 5-3 EMISSIONS OF METALS DURING PREPARATION

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CHEMICAL NAME	# OF MONTHLY PREPARATIONS	MASS OF PREPARATION (ug)	PERCENT EMISSION (%)	MONTHS PER YEAR	ANNUAL EMISSIONS (ug)	HOURLY EMISSIONS (ug)	ANNUAL EMISSION (lbs)	HOURLY EMISSION (lbs)
Antimony	1800	1000	0.01	12	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Arsenic	1800	1000	0.01	12	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Beryllium	1800	1000	0.01	12	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Cadmium	1800	1000	0.01	12	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Chromium	1800	1000	0.01	12	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Cobalt	1800	1000	0.01	12	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Lead	1800	1000	0.01	12	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Mercury	1800	1000	0.01	12	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Nickel	1800	1000	0.01	12	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Vanadium	1800	1000	0.01	12	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Zinc	1800	1000	0.01	12	2.16E+03	2.47E-01	4.75E-06	5.42E-10

Table 5-4

ACID EMISSIONS

<u>CHEMICAL NAME</u>	<u># SAMPLES/MTH</u>	<u>AMT ACID (mL)</u>	<u>ACID FRACTION</u>	<u>DENSITY</u>	<u>MONTHS/YR</u>	<u>ANNUAL EMISSIONS (g)</u>	<u>HOURLY EMISSIONS (g)</u>	<u>ANNUAL EMISSIONS (lbs)</u>	<u>HOURLY EMISSIONS (lbs)</u>
Nitric Acid	1800	10	.70	1.41	12	2.13 E+5	2.43 E+1	4.69 E+2	5.35 E-2
HCL	1800	10	.19	1.09	12	4.47 E+4	5.11 E+0	9.85 E+1	1.12 E-2

Table 5-5 EMISSIONS OF METALS DURING ANALYSIS BY AA

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CHEMICAL NAME	# OF MONTHLY SAMPLES	MASS OF METALS	PERCENT OF SAMPLE USED (%)	PERCENT EMISSION (%)	NUMBER OF ANALYSIS PER SAMPLE	MONTHS PER YEAR	ANNUAL EMISSIONS (ug)	HOURLY EMISSIONS (ug)	ANNUAL EMISSION (lbs)	HOURLY EMISSION (lbs)
Antimony	1800	100	5	100	11	12	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Arsenic	1800	100	5	100	11	12	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Beryllium	1800	100	5	100	11	12	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Cadmium	1800	100	5	100	11	12	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Chromium	1800	100	5	100	11	12	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Cobalt	1800	100	5	100	11	12	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Lead	1800	100	5	100	11	12	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Mercury	1800	100	5	100	11	12	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Nickel	1800	100	5	100	11	12	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Vanadium	1800	100	5	100	11	12	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Zinc	1800	100	5	100	11	12	1.19E+06	1.36E+02	2.62E-03	2.99E-07

TABLE 5-6 EMISSIONS OF VOLATILE ORGANIC COMPOUNDS DURING GC ANALYSIS

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CHEMICAL NAME	SAMPLES PER MONTH	SAMPLE CONCENTRATION (ug/mL)	SAMPLE SIZE (mL)	PERCENT EMISSION (%)	MONTHS PER YEAR	ANNUAL EMISSIONS (ug)	HOURLY EMISSIONS (ug)	ANNUAL EMISSION (lbs.)	HOURLY EMISSION (lbs.)
Acrolein	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Acrylonitrile	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Allyl chloride	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Benzene	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Benzyl chloride	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Bromodichloromethane	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Bromomethane	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Carbon tetrachloride	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Chloroform	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Chloromethane	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Chloromethyl methyl ether	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Chloroprene	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
1,2-Dibromoethane	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
1,2-Dichloroethane	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
1,1-Dichloroethene	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
>Dimethyl sulfate	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
1,4-Dioxane	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Epichlorohydrin	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Ethylene oxide	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
>Ethyleneimine	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Hexachlorobutadiene	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Methylene chloride	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
>2-Methylfuran	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Methyl iodide	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
>Methylisocyanate	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
b-Propiolactone	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Styrene	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
1,1,2,2-Tetrachloroethane	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Tetrachloroethene	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
1,1,2-Trichloroethane	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Trichloroethene	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
>Vinyl bromide	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Vinyl chloride	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14

Table 5-7 EMISSIONS OF SEMIVOLATILE ORGANIC COMPONENTS DURING GC ANALYSIS

CHEMICAL NAME	SAMPLES PER MONTH	SAMPLE CONCENTRATION (ug/mL)	SAMPLE SIZE (mL)	PERCENT EMISSION (%)	MONTHS PER YEAR	ANNUAL EMISSIONS (ug)	HOURLY EMISSIONS (ug)	ANNUAL EMISSION (lbs.)	HOURLY EMISSION (lbs.)
>Acrylamide	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
>Aldicarb	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Aldrin	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
4-Aminobiphenyl	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Aniline	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
PCB-1016	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
PCB-1221	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
PCB-1232	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
PCB-1242	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
PCB-1248	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
PCB-1254	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
PCB-1260	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Benzidine	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Benzo(a)pyrene	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Gamma-BHC (lindane)	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Bis(2-ethylhexyl) phthalate	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
>Bromodidone	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Chlordane	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Chrysene	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
4,4'-DDT	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
3,3'-Dichlorobenzidine	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Dieldrin	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
3,3'-Dimethylbenzidine	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
1,2-Dinitrobenzene	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Heptachlor	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Hexachlorobutadiene	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Hexamethyl phosphoramide	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Kepone	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
>Mirex	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
4,4'-Methylenebis(2-chloroaniline)	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
2-Naphthylamine	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
4-Nitrobiphenyl	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
N-Nitrosodimethylamine	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Parathion ethyl	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
>4-Penten-2-ol	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Phenacetin	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Toluene diisocyanate	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
c-Toliduidine	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Toxaphene	240	1	0.005	1	12	1.44E-01	1.64E-05	3.17E-10	3.62E-14

Table 6-1 Summary of Air Emissions for a Fume Hood

CHEMICAL NAME	ANNUAL EMISSIONS (ug)	HOURLY EMISSIONS (ug)	ANNUAL EMISSIONS (lbs)	HOURLY EMISSIONS (lbs)
VOLATILES				
Acrolein	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Acrylonitrile	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Allyl chloride	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Benzene	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Benzyl chloride	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Bromodichloromethane	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Bromomethane	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Carbon tetrachloride	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Chloroform	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Chloromethane	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Chloromethyl methyl ether	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Chloroprene	4.80E+02	5.48E-02	1.06E-06	1.21E-10
1,2-Dibromoethane	9.60E+02	1.10E-01	2.11E-06	2.41E-10
1,2-Dichloroethane	1.44E+03	1.64E-01	3.17E-06	3.62E-10
1,1-Dichloroethene	1.44E+03	1.64E-01	3.17E-06	3.62E-10
>Dimethyl sulfate	4.80E+02	5.48E-02	1.06E-06	1.21E-10
1,4-Dioxane	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Epichlorohydrin	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Ethylene oxide	4.80E+02	5.48E-02	1.06E-06	1.21E-10
>Ethyleneimine	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Hexachlorobutadiene	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Methylene chloride	3.17E+11	3.62E+07	6.97E+02	7.96E-02
>2-Methyl furan	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Methyl iodide	4.80E+02	5.48E-02	1.06E-06	1.21E-10
>Methyl isocyanate	4.80E+02	5.48E-02	1.06E-06	1.21E-10
b-Propiolactone	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Styrene	9.60E+02	1.10E-01	2.11E-06	2.41E-10
1,1,2,2-Tetrachloroethane	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Tetrachloroethene	1.44E+03	1.64E-01	3.17E-06	3.62E-10
1,1,2-Trichloroethane	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Trichloroethene	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Vinyl chloride	1.44E+03	1.64E-01	3.17E-06	3.62E-10
>Vinyl bromide	4.80E+02	5.48E-02	1.06E-06	1.21E-10
SEMI-VOLATILE ORGANICS				
>Acrylamide	4.80E+02	5.48E-02	1.06E-06	1.21E-10
>Aldicarb	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Aldrin	9.60E+02	1.10E-01	2.11E-06	2.41E-10
4-Aminobiphenyl	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Aniline	4.80E+02	5.48E-02	1.06E-06	1.21E-10

Table 6-1 Summary of Air Emissions for a Fume Hood

CHEMICAL NAME	ANNUAL EMISSIONS (ug)	HOURLY EMISSIONS (ug)	ANNUAL EMISSIONS (lbs)	HOURLY EMISSIONS (lbs)
VOLATILES				
PCB-1016	4.80E+01	5.48E-03	1.06E-07	1.21E-11
PCB-1221	4.80E+01	5.48E-03	1.06E-07	1.21E-11
PCB-1232	4.80E+01	5.48E-03	1.06E-07	1.21E-11
PCB-1242	4.80E+01	5.48E-03	1.06E-07	1.21E-11
PCB-1248	4.80E+01	5.48E-03	1.06E-07	1.21E-11
PCB-1254	4.80E+01	5.48E-03	1.06E-07	1.21E-11
PCB-1260	4.80E+01	5.48E-03	1.06E-07	1.21E-11
Benzidine	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Benzo(a)pyrene	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Gamma-BHC (lindane)	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Bis(2-ethylhexyl)phthalate	9.60E+02	1.10E-01	2.11E-06	2.41E-10
>Bromodiolone	1.44E+03	1.64E-01	3.17E-06	3.62E-10
Chlordane	4.80E+01	5.48E-03	1.06E-07	1.21E-11
Chrysene	9.60E+02	1.10E-01	2.11E-06	2.41E-10
4,4'-DDT	9.60E+02	1.10E-01	2.11E-06	2.41E-10
3,3'-Dichlorobenzidine	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Dieldrin	9.60E+02	1.10E-01	2.11E-06	2.41E-10
3,3'-Dimethylbenzidine	4.80E+02	5.48E-02	1.06E-06	1.21E-10
1,2-Dinitrobenzene	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Heptachlor	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Hexachlorobutadiene	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Hexamethyl phosphoramide	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Kepone	4.80E+02	5.48E-02	1.06E-06	1.21E-10
>Mirex	4.80E+02	5.48E-02	1.06E-06	1.21E-10
4,4'-Methylenebis(2-chloroaniline)	4.80E+02	5.48E-02	1.06E-06	1.21E-10
2-Naphthylamine	4.80E+02	5.48E-02	1.06E-06	1.21E-10
4-Nitrobiphenyl	4.80E+02	5.48E-02	1.06E-06	1.21E-10
N-Nitrosodimethylamine	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Parathion ethyl	9.60E+02	1.10E-01	2.11E-06	2.41E-10
Phenacetin	4.80E+02	5.48E-02	1.06E-06	1.21E-10
>4-Penten-2-ol	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Toluene diisocyanate	4.80E+02	5.48E-02	1.06E-06	1.21E-10
o-Tolidine	4.80E+02	5.48E-02	1.06E-06	1.21E-10
Toxaphene	4.80E+01	5.48E-03	1.06E-07	1.21E-11
METALS				
Antimony	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Arsenic	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Beryllium	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Cadmium	2.16E+03	2.47E-01	4.75E-06	5.42E-10

Table 6-1 Summary of Air Emissions for a Fume Hood

CHEMICAL NAME	ANNUAL EMISSIONS (ug)	HOURLY EMISSIONS (ug)	ANNUAL EMISSIONS (lbs)	HOURLY EMISSIONS (lbs)
VOLATILES				
Chromium	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Cobalt	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Lead	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Mercury	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Nickel	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Vanadium	2.16E+03	2.47E-01	4.75E-06	5.42E-10
Zinc	2.16E+03	2.47E-01	4.75E-06	5.42E-10
CHEMICAL NAME				
ACIDS				
	ANNUAL EMISSIONS (g)	HOURLY EMISSIONS (g)	ANNUAL EMISSIONS (lbs)	HOURLY EMISSIONS (lbs)
Nitric Acid	2.13 E+5	2.43 E+1	4.69 E+2	5.35 E-2
Hydrochloric Acid	4.47 E+4	5.11 E+0	9.85 E+1	1.12 E-2

Table 6-2 Summary of Air Emissions for a Local Exhaust Drop

CHEMICAL NAME	ANNUAL EMISSIONS (ug)	HOURLY EMISSIONS (ug)	ANNUAL EMISSIONS (lbs)	HOURLY EMISSIONS (lbs)
VOLATILE ORGANICS				
Acrolein	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Acrylonitrile	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Allyl chloride	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Benzene	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Benzyl chloride	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Bromodichloromethane	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Bromomethane	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Carbon tetrachloride	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Chloroform	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Chloromethane	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Chloromethyl methyl ether	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Chloroprene	1.44E-01	1.64E-05	3.17E-10	3.62E-14
1,2-Dibromoethane	1.44E-01	1.64E-05	3.17E-10	3.62E-14
1,2-Dichloroethane	1.44E-01	1.64E-05	3.17E-10	3.62E-14
1,1-Dichloroethene	1.44E-01	1.64E-05	3.17E-10	3.62E-14
>Dimethyl sulfate	1.44E-01	1.64E-05	3.17E-10	3.62E-14
1,4-Dioxane	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Epichlorohydrin	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Ethylene oxide	1.44E-01	1.64E-05	3.17E-10	3.62E-14
>Ethyleneimine	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Hexachlorobutadiene	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Methylene chloride	1.44E-01	1.64E-05	3.17E-10	3.62E-14
>2-Methyl furan	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Methyl iodide	1.44E-01	1.64E-05	3.17E-10	3.62E-14
>Methyl isocyanate	1.44E-01	1.64E-05	3.17E-10	3.62E-14
b-Propiolactone	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Styrene	1.44E-01	1.64E-05	3.17E-10	3.62E-14
1,1,2,2-Tetrachloroethane	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Tetrachloroethene	1.44E-01	1.64E-05	3.17E-10	3.62E-14
1,1,2-Trichloroethane	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Trichloroethene	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Vinyl chloride	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Vinyl bromide	1.44E-01	1.64E-05	3.17E-10	3.62E-14
SEMI-VOLATILE ORGANICS				
>Acrylamide	1.44E-01	1.64E-05	3.17E-10	3.62E-14
>Aldicarb	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Aldrin	1.44E-01	1.64E-05	3.17E-10	3.62E-14
4-Aminobiphenyl	1.44E-01	1.64E-05	3.17E-10	3.62E-14

Table 6-2 Summary of Air Emissions for a Local Exhaust Drop

CHEMICAL NAME	ANNUAL EMISSIONS (ug)	HOURLY EMISSIONS (ug)	ANNUAL EMISSIONS (lbs)	HOURLY EMISSIONS (lbs)
VOLATILE ORGANICS				
Aniline	1.44E-01	1.64E-05	3.17E-10	3.62E-14
PCB-1016	1.44E-01	1.64E-05	3.17E-10	3.62E-14
PCB-1221	1.44E-01	1.64E-05	3.17E-10	3.62E-14
PCB-1232	1.44E-01	1.64E-05	3.17E-10	3.62E-14
PCB-1242	1.44E-01	1.64E-05	3.17E-10	3.62E-14
PCB-1248	1.44E-01	1.64E-05	3.17E-10	3.62E-14
PCB-1254	1.44E-01	1.64E-05	3.17E-10	3.62E-14
PCB-1260	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Benzidine	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Benzo(a)pyrene	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Gamma-BHC (lindane)	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Bis(2-ethylhexyl)phthalate	1.44E-01	1.64E-05	3.17E-10	3.62E-14
>Bromodiolone	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Chlordane	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Chrysene	1.44E-01	1.64E-05	3.17E-10	3.62E-14
4,4'-DDT	1.44E-01*	1.64E-05	3.17E-10	3.62E-14
3,3'-Dichlorobenzidine	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Dieldrin	1.44E-01	1.64E-05	3.17E-10	3.62E-14
3,3'-Dimethylbenzidine	1.44E-01	1.64E-05	3.17E-10	3.62E-14
1,2-Dinitrobenzene	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Heptachlor	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Hexachlorobutadiene	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Hexamethyl phosphoramide	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Kepone	1.44E-01	1.64E-05	3.17E-10	3.62E-14
>Mirex	1.44E-01	1.64E-05	3.17E-10	3.62E-14
4,4'-Methylenebis(2-chloroaniline)	1.44E-01	1.64E-05	3.17E-10	3.62E-14
2-Naphthylamine	1.44E-01	1.64E-05	3.17E-10	3.62E-14
4-Nitrobiphenyl	1.44E-01	1.64E-05	3.17E-10	3.62E-14
N-Nitrosodimethylamine	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Parathion ethyl	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Phenacetin	1.44E-01	1.64E-05	3.17E-10	3.62E-14
>4-Penten-2-ol	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Toluene diisocyanate	1.44E-01	1.64E-05	3.17E-10	3.62E-14
o-Tolididine	1.44E-01	1.64E-05	3.17E-10	3.62E-14
Toxaphene	1.44E-01	1.64E-05	3.17E-10	3.62E-14
METALS				
Antimony	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Arsenic	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Beryllium	1.19E+06	1.36E+02	2.62E-03	2.99E-07

Table 6-2 Summary of Air Emissions for a Local Exhaust Drop

CHEMICAL NAME	ANNUAL EMISSIONS (ug)	HOURLY EMISSIONS (ug)	ANNUAL EMISSIONS (lbs)	HOURLY EMISSIONS (lbs)
VOLATILE ORGANICS				
Cadmium	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Chromium	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Cobalt	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Lead	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Mercury	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Nickel	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Vanadium	1.19E+06	1.36E+02	2.62E-03	2.99E-07
Zinc	1.19E+06	1.36E+02	2.62E-03	2.99E-07

Table 6-3 Summary of Air Emissions for the EAA - 7 Fume Hoods and 8 Local Exhaust Drops

CHEMICAL NAME	ANNUAL EMISSIONS (ug)	HOURLY EMISSIONS (ug)	ANNUAL EMISSIONS (lbs)	HOURLY EMISSIONS (lbs)
VOLATILE ORGANICS				
Acrolein	6.72E+03	7.67E-01	1.48E-05	1.69E-09
Acrylonitrile	6.72E+03	7.67E-01	1.48E-05	1.69E-09
Allyl chloride	3.36E+03	3.84E-01	7.39E-06	8.44E-10
Benzene	1.01E+04	1.15E+00	2.22E-05	2.53E-09
Benzyl chloride	6.72E+03	7.67E-01	1.48E-05	1.69E-09
Bromodichloromethane	1.01E+04	1.15E+00	2.22E-05	2.53E-09
Bromomethane	1.01E+04	1.15E+00	2.22E-05	2.53E-09
Carbon tetrachloride	1.01E+04	1.15E+00	2.22E-05	2.53E-09
Chloroform	1.01E+04	1.15E+00	2.22E-05	2.53E-09
Chloromethane	1.01E+04	1.15E+00	2.22E-05	2.53E-09
Chloromethyl methyl ether	3.36E+03	3.84E-01	7.39E-06	8.44E-10
Chloroprene	3.36E+03	3.84E-01	7.39E-06	8.44E-10
1,2-Dibromoethane	6.72E+03	7.67E-01	1.48E-05	1.69E-09
1,2-Dichloroethane	1.01E+04	1.15E+00	2.22E-05	2.53E-09
>Dimethyl sulfide	3.36E+03	3.84E-01	7.39E-06	8.44E-10
1,1-Dichloroethene	1.01E+04	1.15E+00	2.22E-05	2.53E-09
1,4-Dioxane	3.36E+03	3.84E-01	7.39E-06	8.44E-10
Epichlorohydrin	3.36E+03	3.84E-01	7.39E-06	8.44E-10
Ethylene oxide	3.36E+03	3.84E-01	7.39E-06	8.44E-10
Ethyleneimine	3.36E+03	3.84E-01	7.39E-06	8.44E-10
Hexachlorobutadiene	6.72E+03	7.67E-01	1.48E-05	1.69E-09
Methylene chloride	2.22E+12	2.53E+08	4.88E+03	5.57E-01
>2-Methyl furan	3.36E+03	3.84E-01	7.39E-06	8.44E-10
Methyl iodide	3.36E+03	3.84E-01	7.39E-06	8.44E-10
>Methyl isocyanate	3.36E+03	3.84E-01	7.39E-06	8.44E-10
b-Propiolactone	3.36E+03	3.84E-01	7.39E-06	8.44E-10
Styrene	6.72E+03	7.67E-01	1.48E-05	1.69E-09
1,1,2,2-Tetrachloroethane	1.01E+04	1.15E+00	2.22E-05	2.53E-09
Tetrachloroethene	1.01E+04	1.15E+00	2.22E-05	2.53E-09
1,1,2-Trichloroethane	1.01E+04	1.15E+00	2.22E-05	2.53E-09
Trichloroethene	1.01E+04	1.15E+00	2.22E-05	2.53E-09
Vinyl chloride	1.01E+04	1.15E+00	2.22E-05	2.53E-09
>Vinyl bromide	3.36E+03	3.84E-01	7.39E-06	8.44E-10
SEMI-VOLATILE ORGANICS				
>Acrylamide	3.36E+03	3.84E-01	7.39E-06	8.44E-10
>Aldicarb	3.36E+03	3.84E-01	7.39E-06	8.44E-10
Aldrin	6.72E+03	7.67E-01	1.48E-05	1.69E-09
4-Aminobiphenyl	3.36E+03	3.84E-01	7.39E-06	8.44E-10

Table 6-3 Summary of Air Emissions for the EAA - 7 Fume Hoods and 8 Local Exhaust Ducts

CHEMICAL NAME	ANNUAL EMISSIONS (ug)	HOURLY EMISSIONS (ug)	ANNUAL EMISSIONS (lbs)	HOURLY EMISSIONS (lbs)
VOLATILE ORGANICS				
Aniline	3.36E+03	3.84E-01	7.39E-06	8.44E-10
PCB-1016	3.37E+02	3.85E-02	7.42E-07	8.47E-11
PCB-1221	3.37E+02	3.85E-02	7.42E-07	8.47E-11
PCB-1232	3.37E+02	3.85E-02	7.42E-07	8.47E-11
PCB-1242	3.37E+02	3.85E-02	7.42E-07	8.47E-11
PCB-1248	3.37E+02	3.85E-02	7.42E-07	8.47E-11
PCB-1254	3.37E+02	3.85E-02	7.42E-07	8.47E-11
PCB-1260	3.37E+02	3.85E-02	7.42E-07	8.47E-11
Benzidine	6.72E+03	7.67E-01	1.48E-05	1.69E-09
Benzo(a)pyrene	6.72E+03	7.67E-01	1.48E-05	1.69E-09
Gamma-BHC (lindane)	6.72E+03	7.67E-01	1.48E-05	1.69E-09
Bis(2-ethylhexyl)phthalate	6.72E+03	7.67E-01	1.48E-05	1.69E-09
>Bromodiolone	3.36E+03	3.84E-01	7.39E-06	8.44E-10
Chlordane	3.37E+02	3.85E-02	7.42E-07	8.47E-11
Chrysene	6.72E+03	7.67E-01	1.48E-05	1.69E-09
4,4'-DDT	6.72E+03	7.67E-01	1.48E-05	1.69E-09
3,3'-Dichlorobenzidine	3.36E+03	3.84E-01	7.39E-06	8.44E-10
Dieldrin	6.72E+03	7.67E-01	1.48E-05	1.69E-09
3,3'-Dimethylbenzidine	3.36E+03	3.84E-01	7.39E-06	8.44E-10
1,2-Dinitrobenzene	3.36E+03	3.84E-01	7.39E-06	8.44E-10
Heptachlor	6.72E+03	7.67E-01	1.48E-05	1.69E-09
Hexachlorobutadiene	6.72E+03	7.67E-01	1.48E-05	1.69E-09
Hexamethyl phosphoramide	3.36E+03	3.84E-01	7.39E-06	8.44E-10
Kepone	3.36E+03	3.84E-01	7.39E-06	8.44E-10
>Mirax	3.36E+03	3.84E-01	7.39E-06	8.44E-10
4,4'-Methylenebis(2-chloroaniline)	3.36E+03	3.84E-01	7.39E-06	8.44E-10
2-Naphthylamine	3.36E+03	3.84E-01	7.39E-06	8.44E-10
4-Nitrobiphenyl	3.36E+03	3.84E-01	7.39E-06	8.44E-10
N-Nitrosodimethylamine	6.72E+03	7.67E-01	1.48E-05	1.69E-09
Parathion ethyl	6.72E+03	7.67E-01	1.48E-05	1.69E-09
Phenacetin	3.36E+03	3.84E-01	7.39E-06	8.44E-10
>4-Penten-2-ol	3.36E+03	3.84E-01	7.3E-06	8.44E-10
Toluene diisocyanate	3.36E+03	3.84E-01	7.39E-06	8.44E-10
o-Tolidine	3.36E+03	3.84E-01	7.39E-06	8.44E-10
Toxaphene	3.37E+02	3.85E-02	7.42E-07	8.47E-11

Table 6-3 Summary of Air Emissions for the EAA - 7 Fume Hoods and 8 Local Exhaust Drops

CHEMICAL NAME	ANNUAL EMISSIONS (ug)	HOURLY EMISSIONS (ug)	ANNUAL EMISSIONS (lbs)	HOURLY EMISSIONS (lbs)
VOLATILE ORGANICS				
Antimony	9.52E+06	1.09E+03	2.09E-02	2.39E-06
Arsenic	9.52E+06	1.09E+03	2.09E-02	2.39E-06
Beryllium	9.52E+06	1.09E+03	2.09E-02	2.39E-06
Cadmium	9.52E+06	1.09E+03	2.09E-02	2.39E-06
Chromium	9.52E+06	1.09E+03	2.09E-02	2.39E-06
Cobalt	9.52E+06	1.09E+03	2.09E-02	2.39E-06
Lead	9.52E+06	1.09E+03	2.09E-02	2.39E-06
Mercury	9.52E+06	1.09E+03	2.09E-02	2.39E-06
Nickel	9.52E+06	1.09E+03	2.09E-02	2.39E-06
Vanadium	9.52E+06	1.09E+03	2.09E-02	2.39E-06
Zinc	9.52E+06	1.09E+03	2.09E-02	2.39E-06

7.0 APPENDIX

- 7.1 Exhibit 1 - General Plan of Expanded Lab Complex.
- 7.2 Drawing No. 4788D002, Sheet 2, General Arrangement of Equipment for EAA Lab.
- 7.3 Bill of Material, DCD-1, dated 10/06/92, Description of Equipment for EAA Lab.

DC:0001717.RM

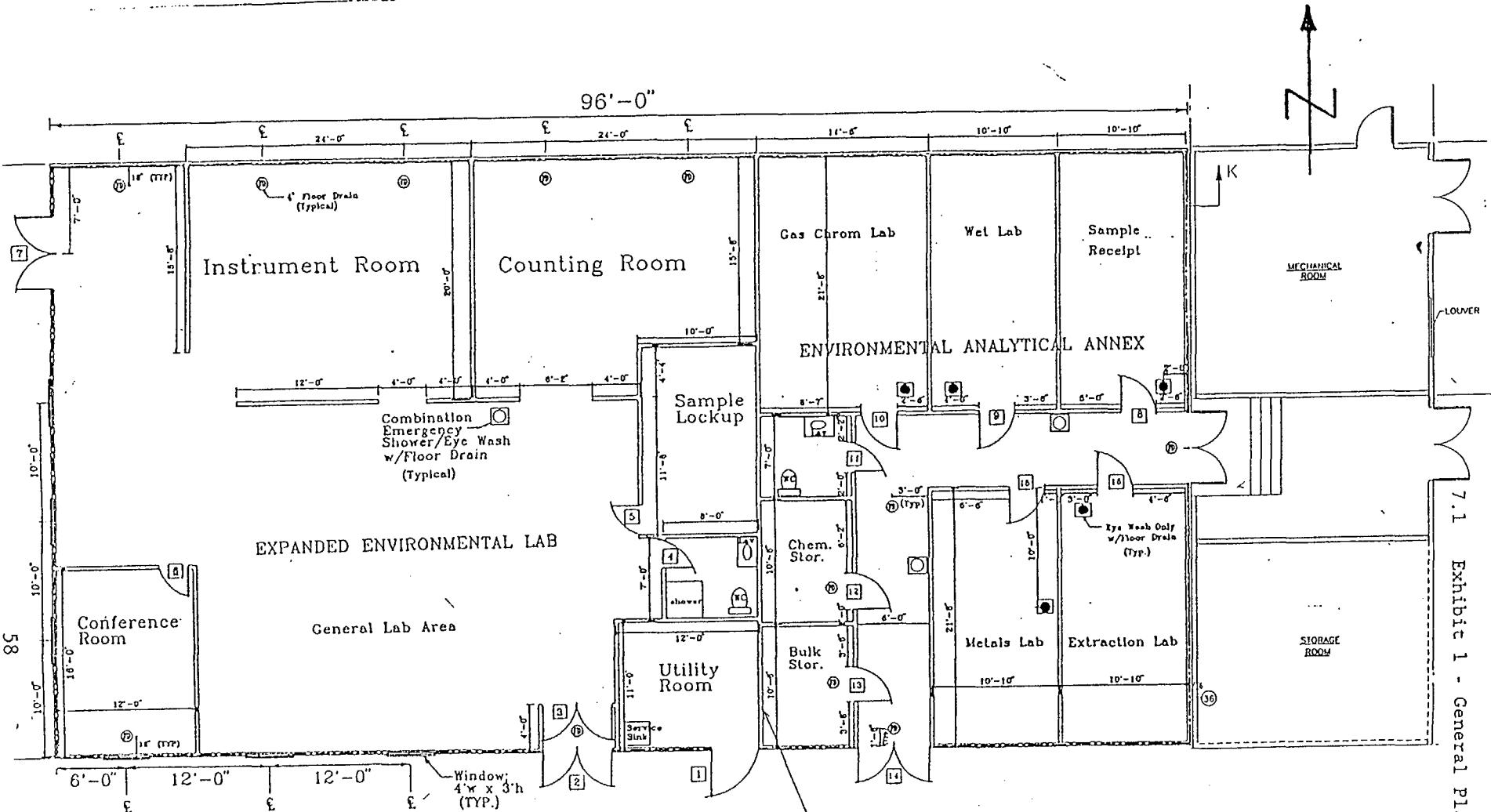
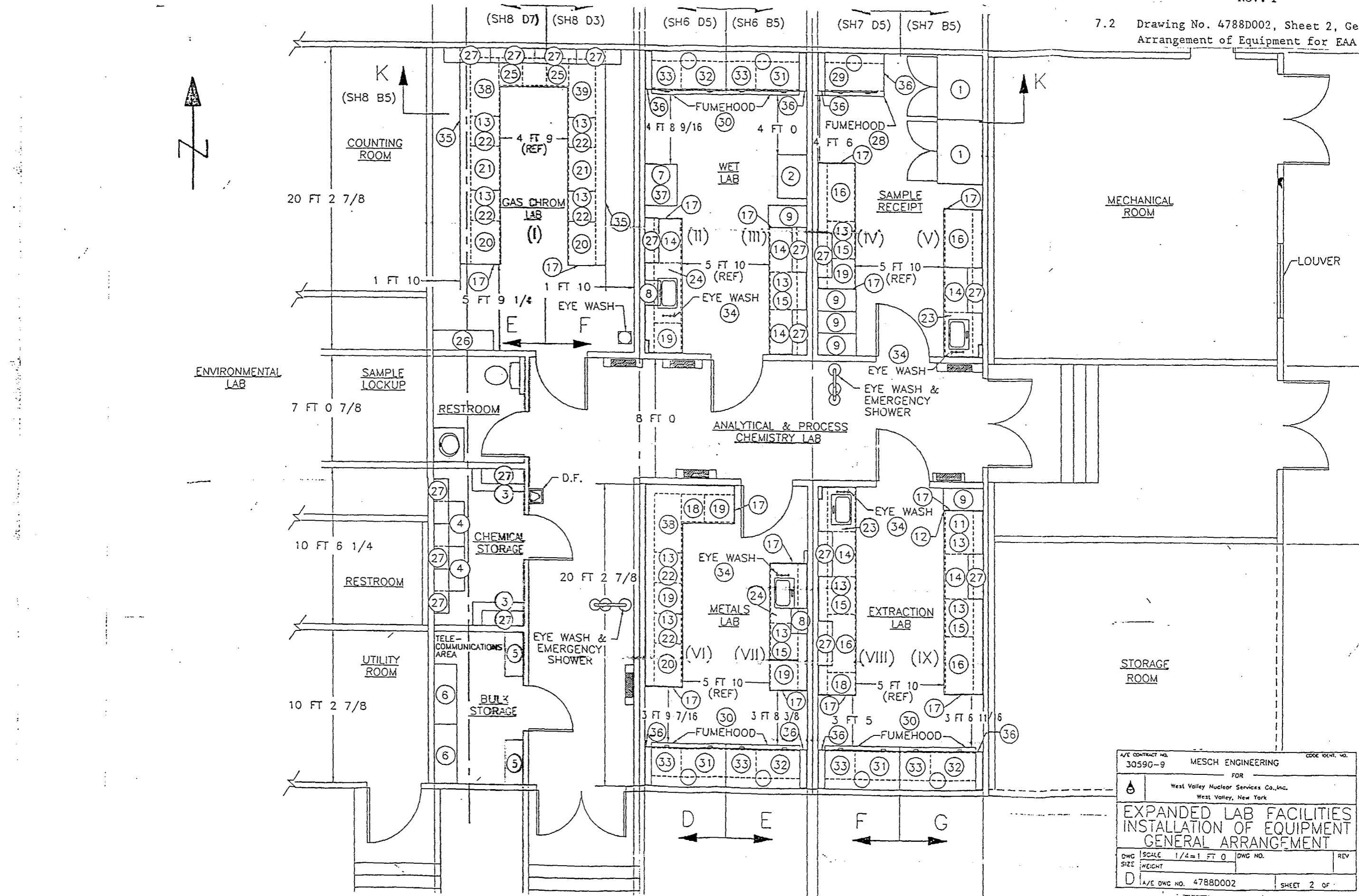


Exhibit 1

	West Valley Nuclear Services Co., Inc. West Valley, New York
TITLE EXPANDED LAB COMPLEX:	
DEPARTMENTAL SPACE LAYOUT	
- NO SCALE -	
DATE 1-14-91 BY M. E. BLAIR	

7.2 Drawing No. 4788D002, Sheet 2, General Arrangement of Equipment for EAA Lab.



BILL OF MATERIAL
DCD-1 10/06/92

Appendix Item 7.3

<u>ITEM NUMBER</u>	<u>QUANTITY</u>	<u>DESCRIPTION</u>
1	2	Isotemp Flammable Materials Refrigerator
2	1	Epoxy Balance Table; Black
3	2	2-Door Corrosive Storage Cabinet
4	2	Flammable Liquid Storage Cabinet 2-Door, Manual
5	3	Industrial Steel Shelving; Open
6	1	Industrial Steel Shelving; Open
7	1	Safety Oven
8	2	Analytical Grade Nanopure Unit
9	5	4-Drawer Letter File Cabinet
10	16	Lab Chair
11	1	1-Drawer Table Apron
12	1	Table Legs
13	12	Knee Space Filler Panel
14	6	7-Drawer Base Unit w/(6) Size 20 (1) Size 30 Drawers
15	5	1-Drawer Table Apron
16	4	7-Drawer Base Unit w/(6) Size 50 (1) Size 60 Drawers
17	14	End Filler Panel
18	2	4-Drawer Base Unit (4) Size 20 Drawers
19	5	4-Drawer Base Unit (4) Size 50 Drawers
20	3	6-Drawer Base Unit w/(4) Size 20 (2) Size 30 Drawers
21	2	7-Drawer Base Unit w/(2) Size 10 (3) Size 30 Drawers, (2) Size 30
22	6	1-Drawer Table Apron
23	2	Sink Cabinet w/Double Doors No Shelves, Cupboard Size 50
--	2	Epoxy Resin Sink Basin
--	2	Hanger Supports for Epoxy Resin Sink Basin

BILL OF MATERIAL
DCD-1 10/06/92

Appendix Item 7.3

<u>ITEM NUMBER</u>	<u>QUANTITY</u>	<u>DESCRIPTION</u>
--	2	Deck-Mounted Faucet
--	2	Epoxy Over Flow
--	2	P/S Trap Outfit
--	2	Black Epoxy Sink Outlet
24	2	Sink Cabinet w/Double Doors
--	2	Epoxy Resin Sink Basin
--	2	Hanger Supports for Epoxy Resin Sink Basin
--	2	Deck-Mounted Faucet
--	2	Epoxy Over Flow
--	2	P/S Trap Outfit
--	2	Black Epoxy Sink Outlet
25	2	5-Drawer Base Unit w/(2) Size 10 (3) Size 20
26	1	Floor Case w/Sliding Glass Doors
27	17	Storage Case w/Sliding Glass Doors-#19-812
28	1	Fumehood - 4 Ft. Width
--	1	Epoxy Worktop, No Cup Sink
29	1	Acid Storage Cabinet with Vent Kit
30	6	Fumehood - 5 Ft. Width
--	6	Epoxy Worktop, No Cup Sink
31	3	Solvent Storage Cabinet with Vent Kit
32	3	Acid Storage Cabinet with Vent Kit
33	6	Cupboard w/Pull-Out Tray Shelf Cupboard Size 10
34	4	Deck Mount Emergency Eye-Wash
35	2	Metal Backs to Match Cabinets
36	8	Floor to Ceiling Filler Panel to Match Cabinets
37	1	Table for Oven
38	2	Straight Corner Cupboard (Right)
39	1	Straight Corner Cupboard (Left)